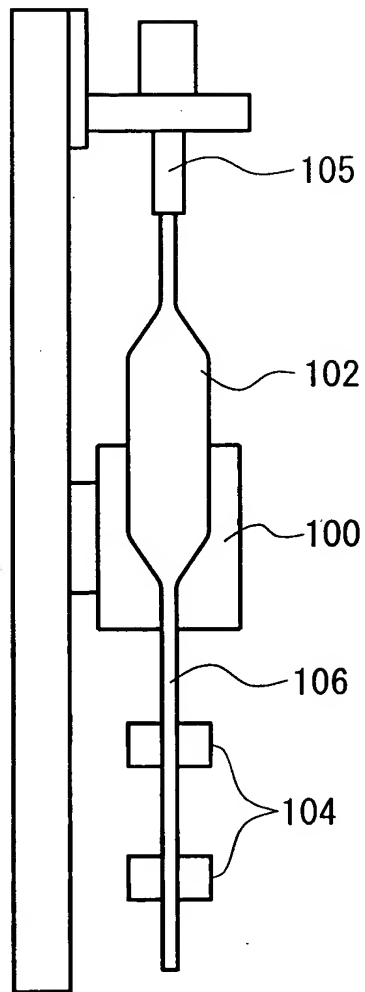
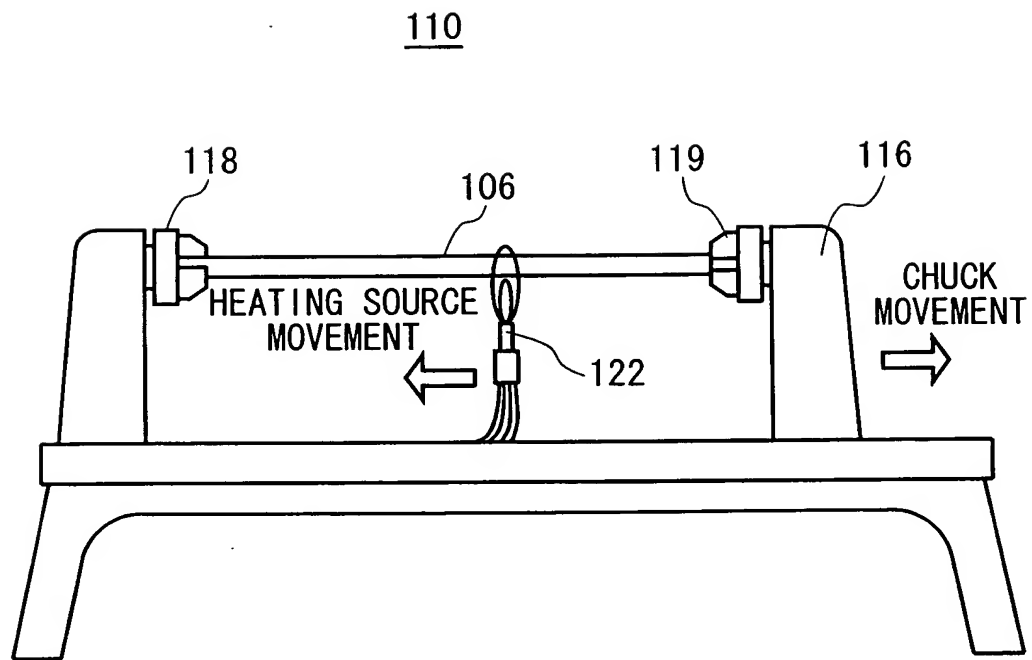


1/45

400



**RELATED ART**  
**FIG. 1**



*RELATED ART  
FIG. 2*

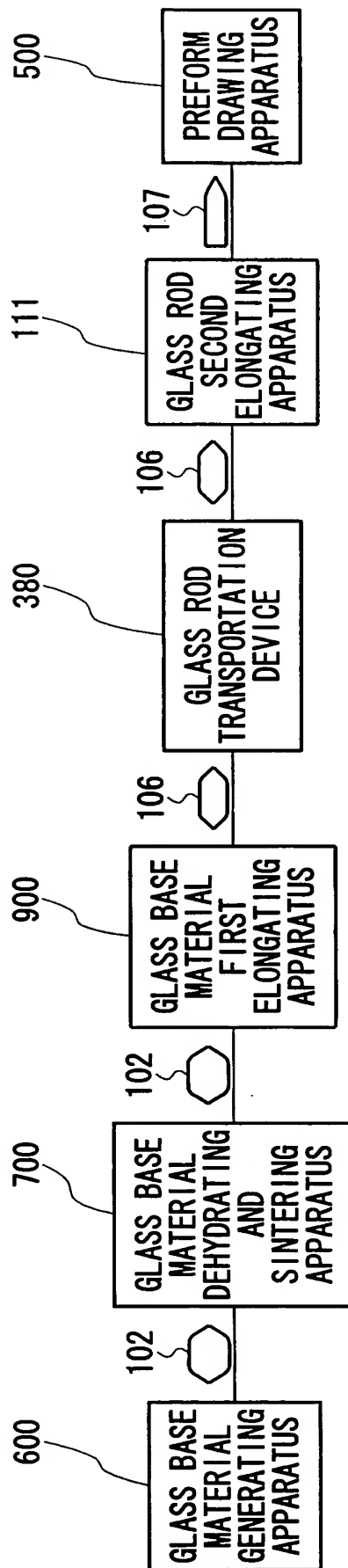


FIG. 3

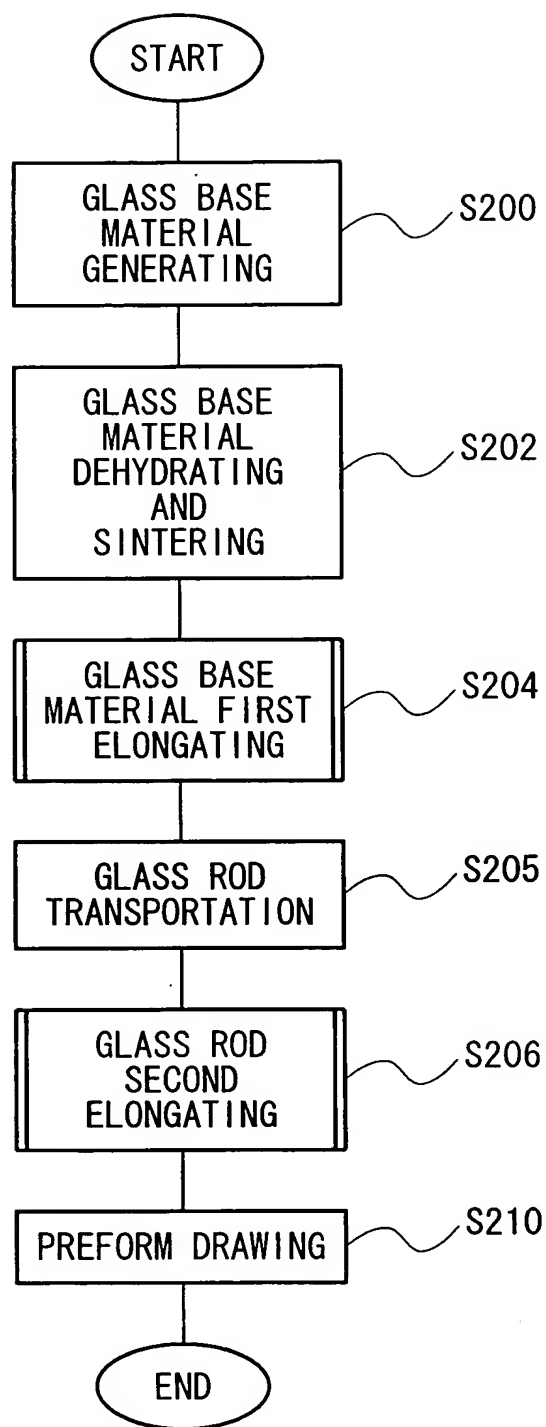


FIG. 4

900

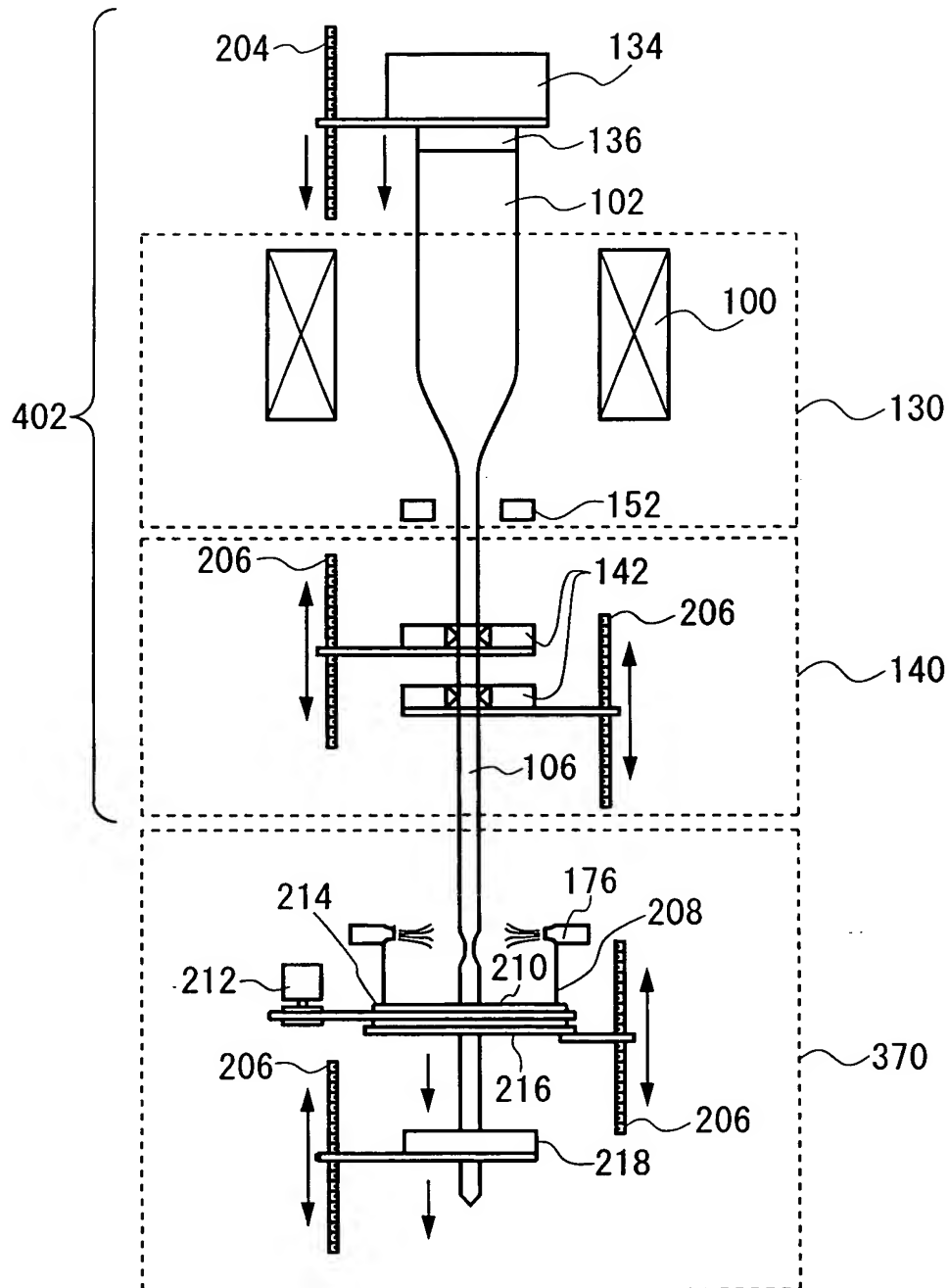
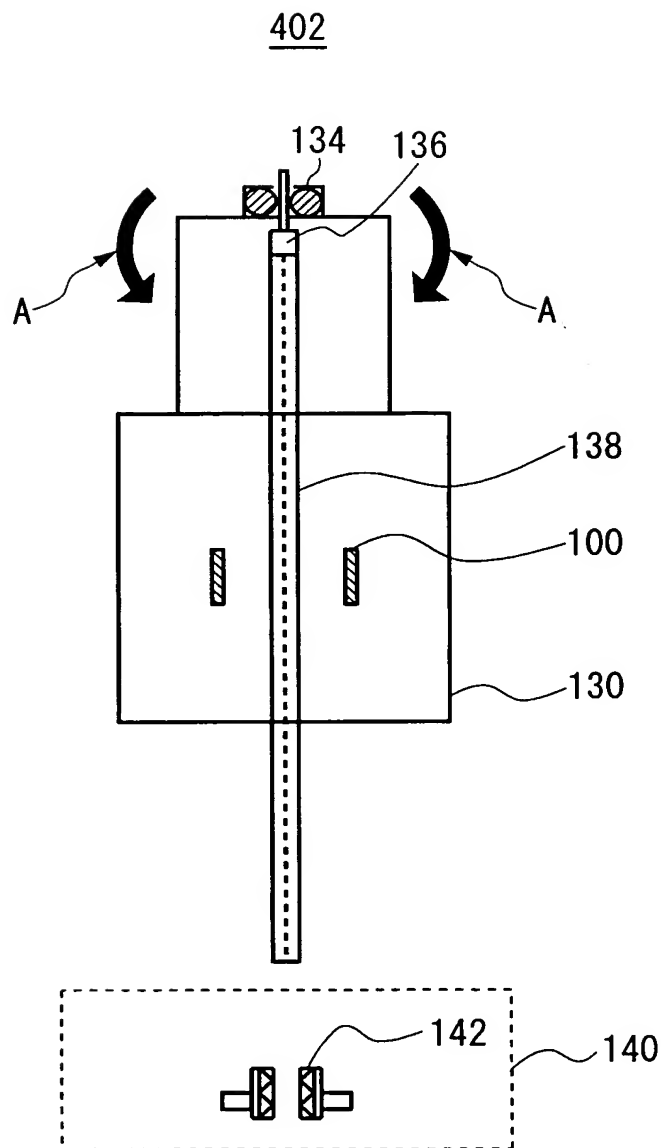


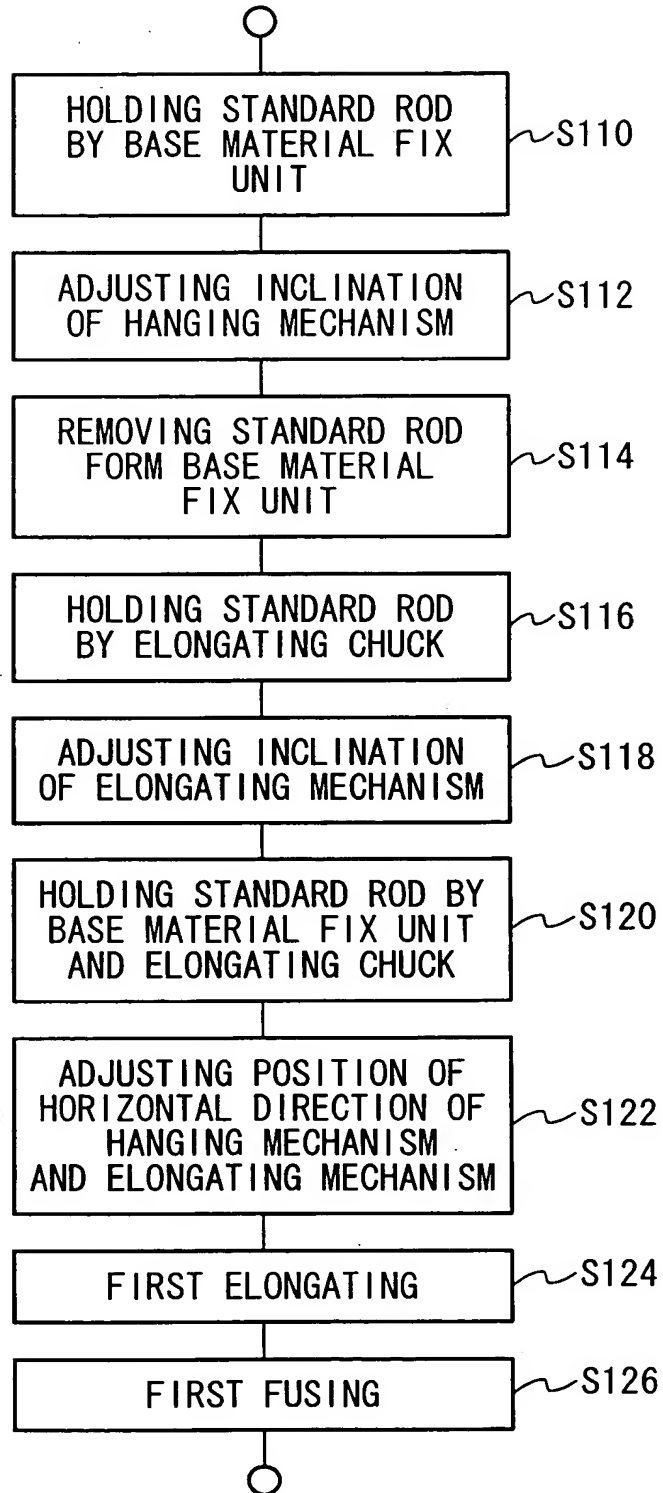
FIG. 5



**FIG. 6**

7/45

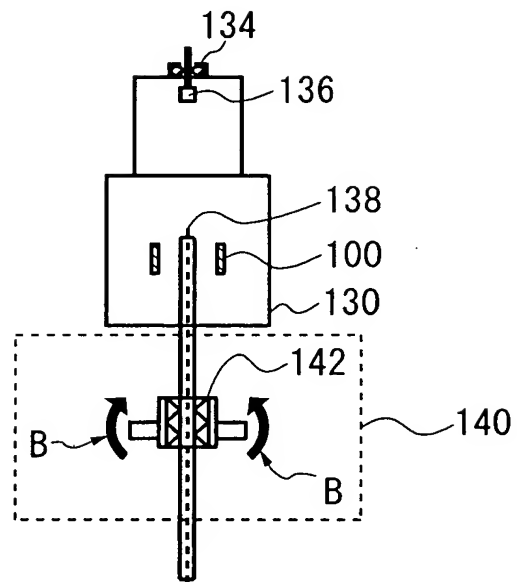
S204



**FIG. 7**

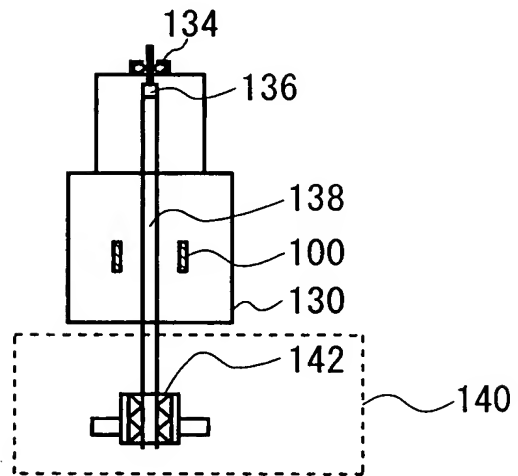
8/45

402



**FIG. 8**

402



**FIG. 9**



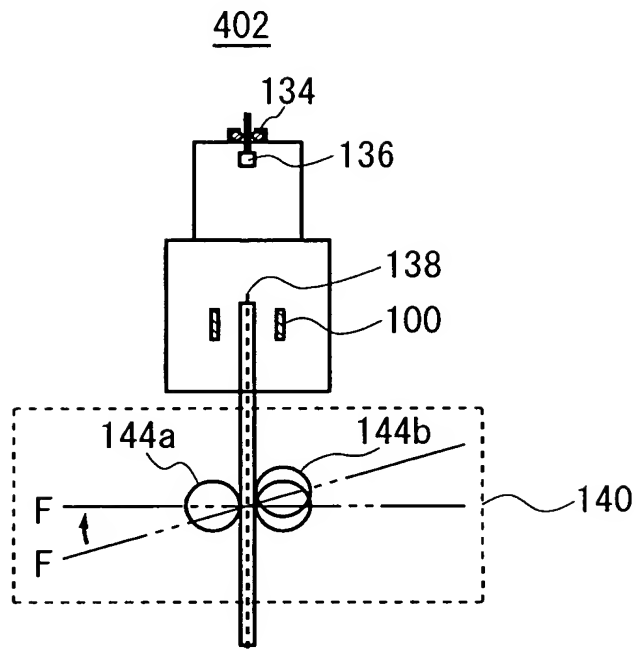


FIG. 10

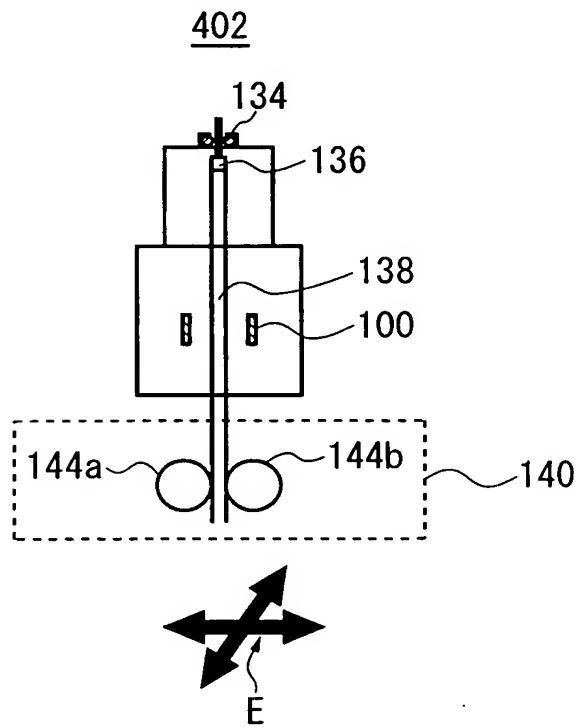
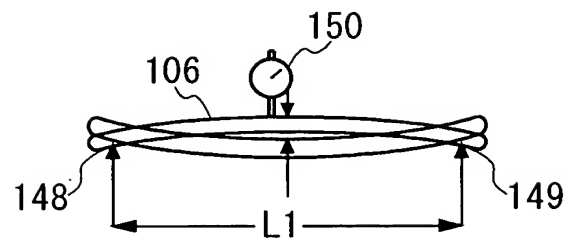
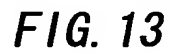


FIG. 11

10/45



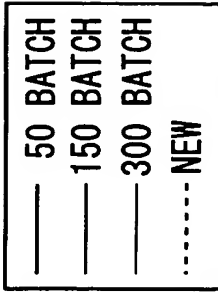
**FIG. 12**



GLASS ROD

AMOUNT OF DEVIATION OF CENTER POSITION	BENDING
1.0	0.40
2.5	0.95
3.5	0.50
7.0	1.10
7.5	1.50
10.0	1.80

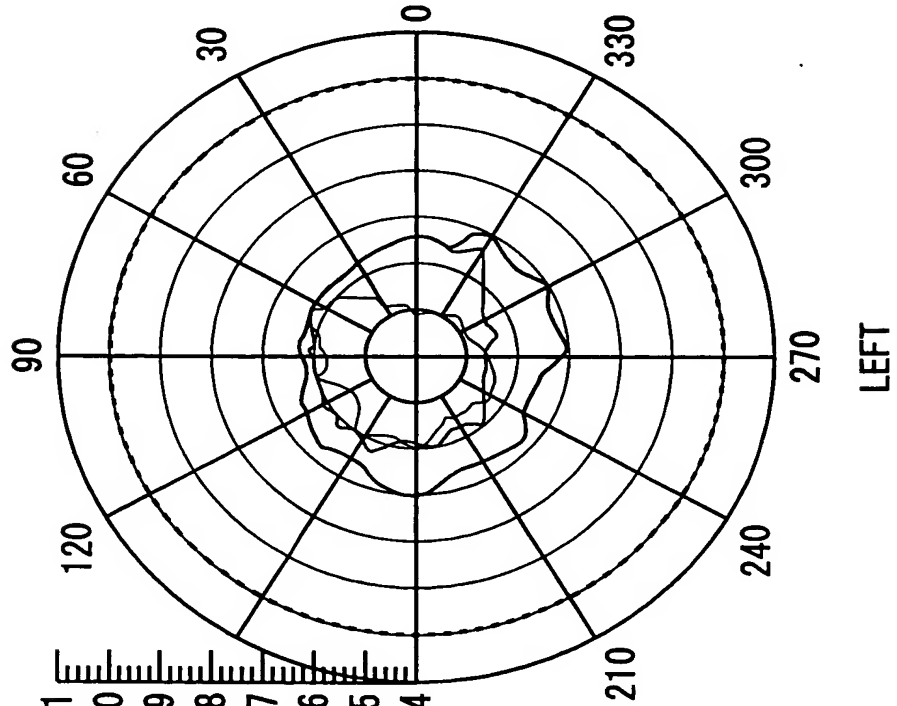
FIG. 14



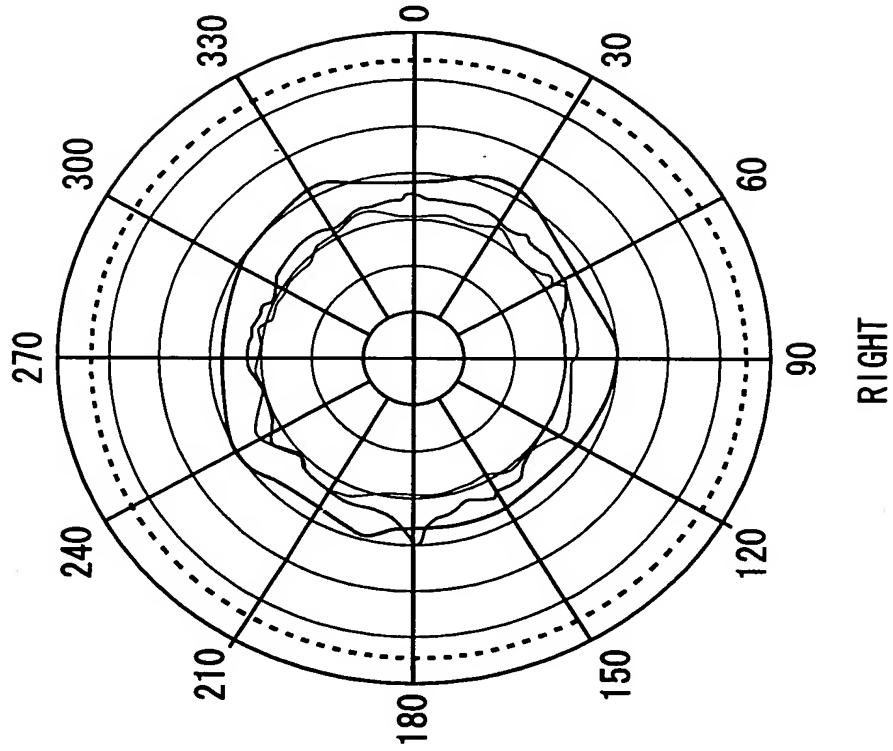
SHAPE OF ROLLER

144a

144b



LEFT



RIGHT

FIG. 15

13/45

DISPLACEMENT OF HEATED SOFTEN REGION

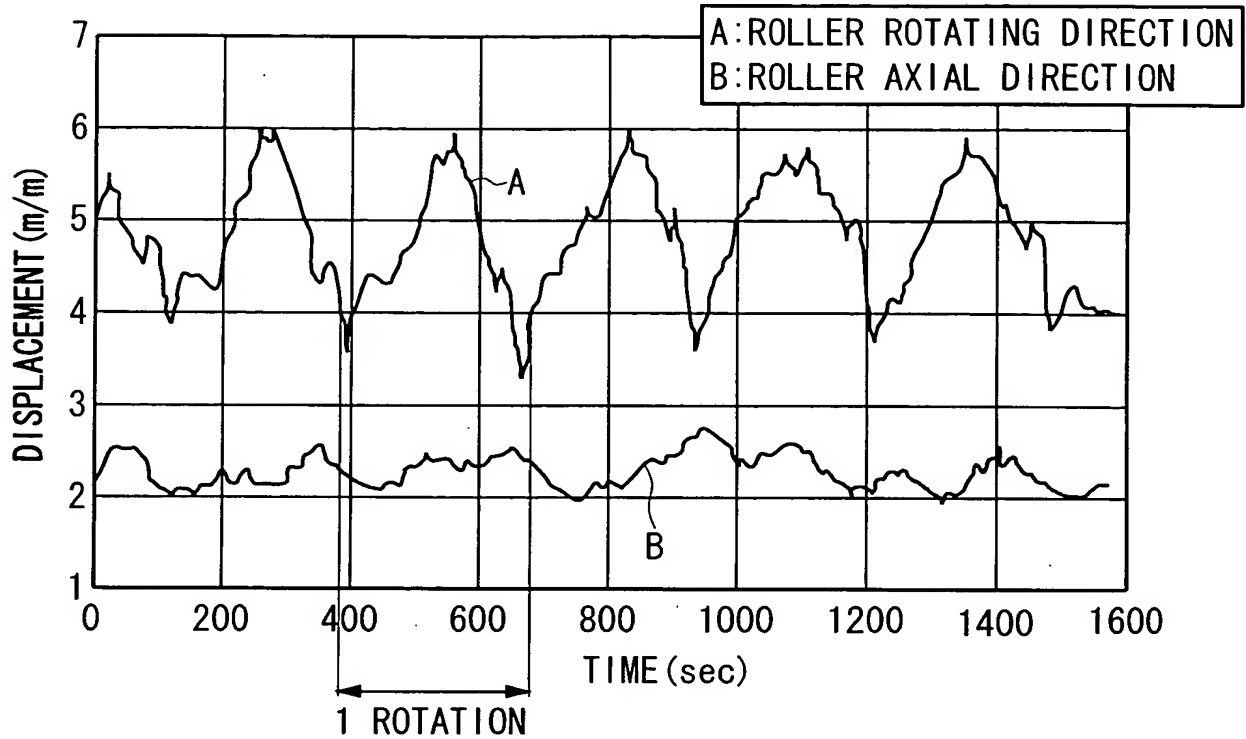


FIG. 16

DISPLACEMENT OF HEATED SOFTEN REGION

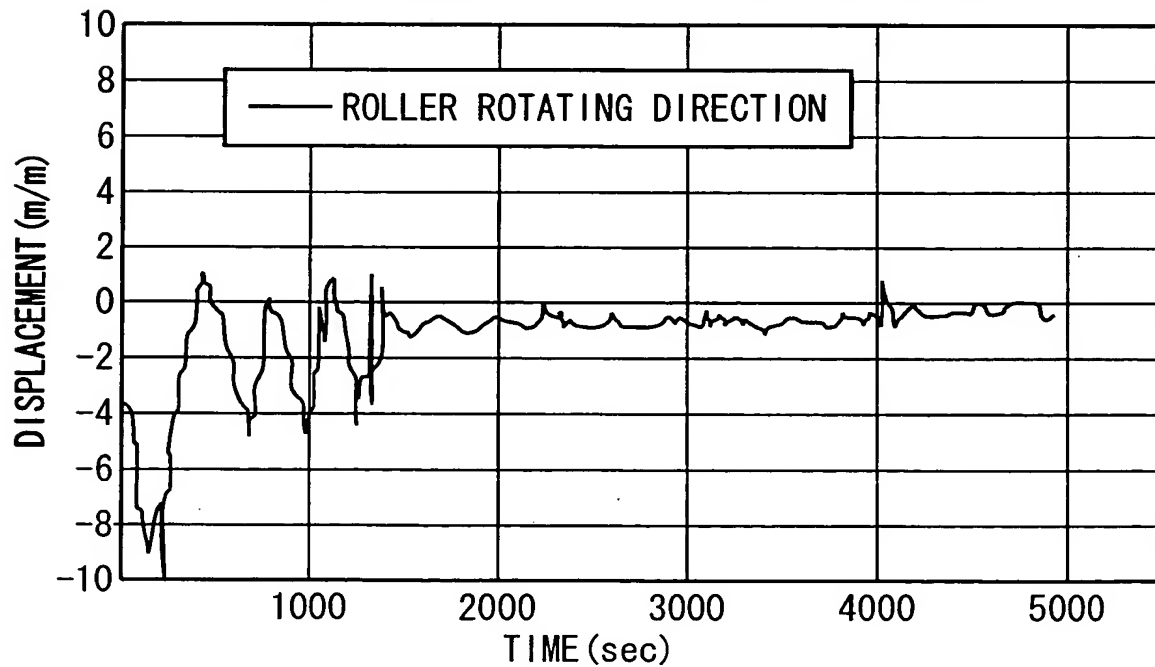
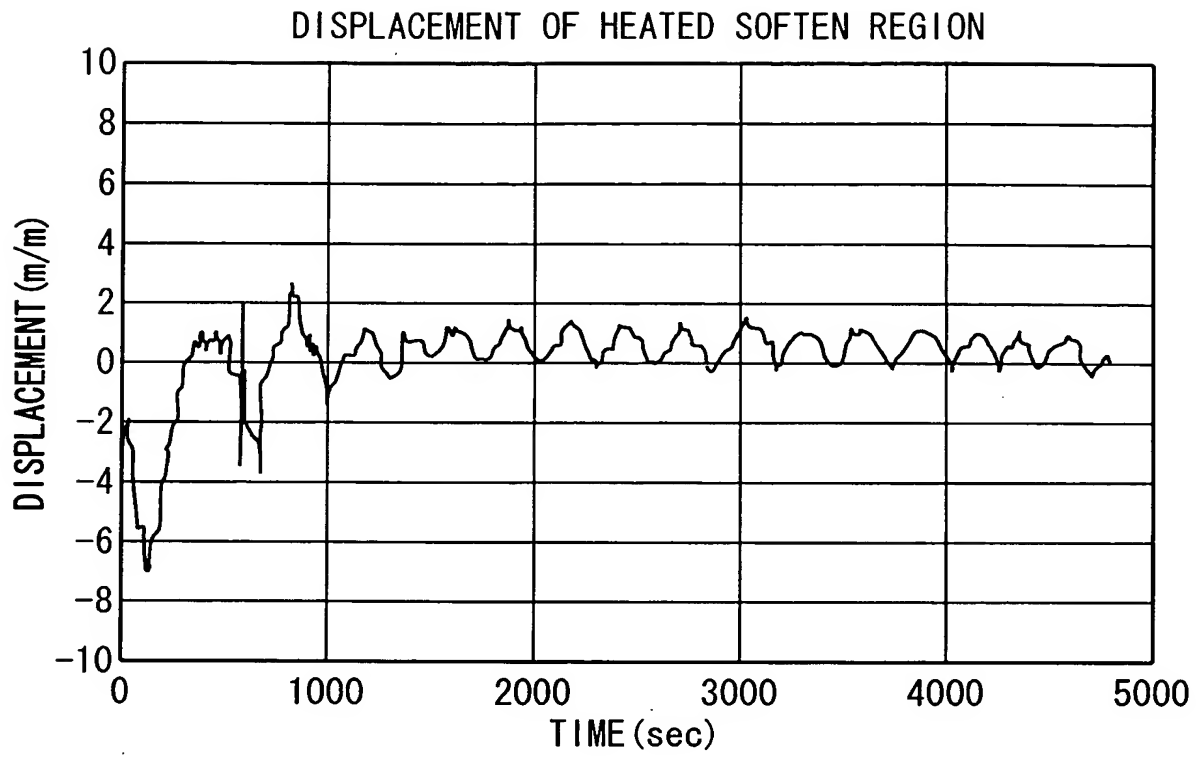
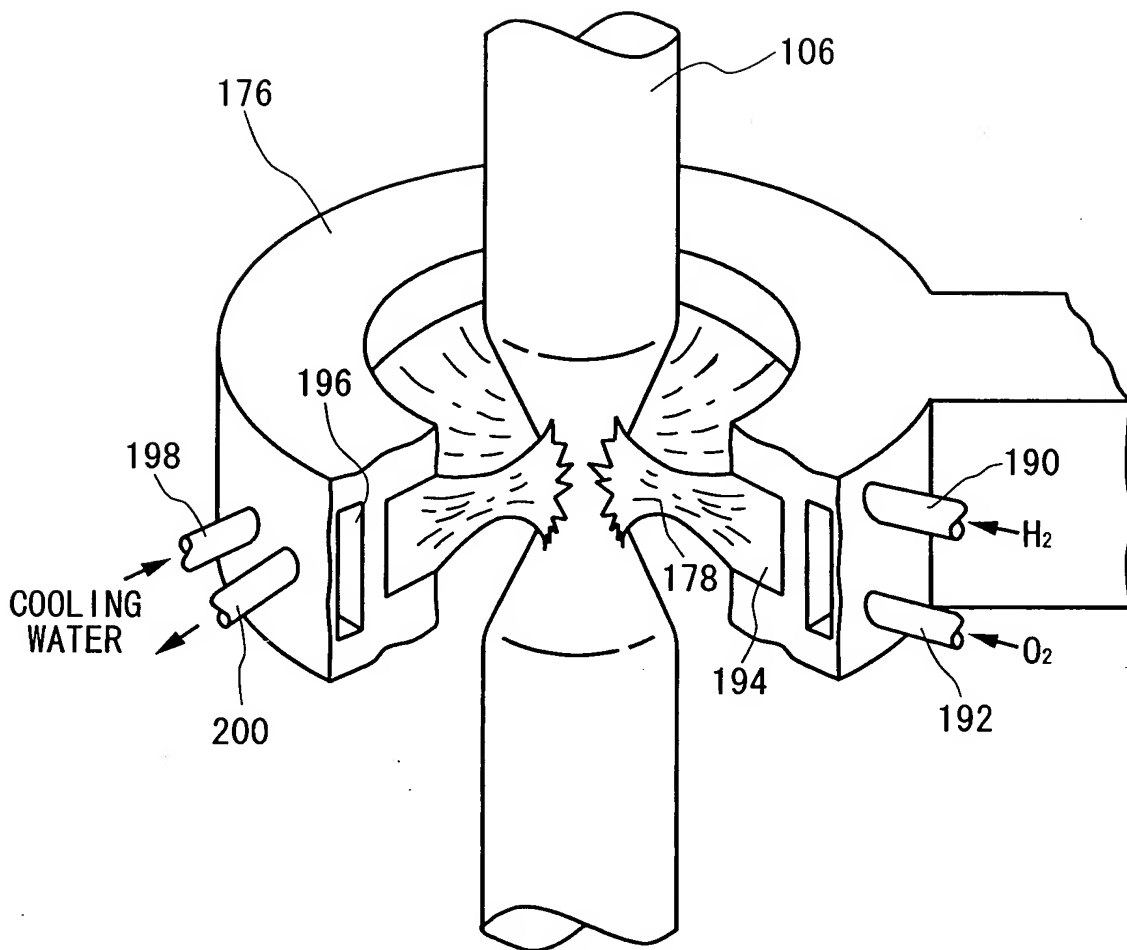


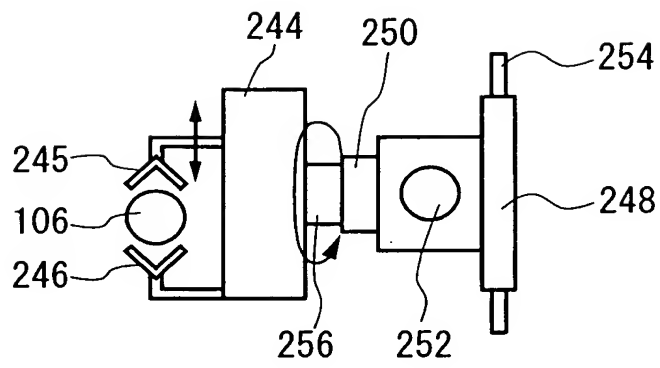
FIG. 17

**FIG. 18**

**FIG. 19**

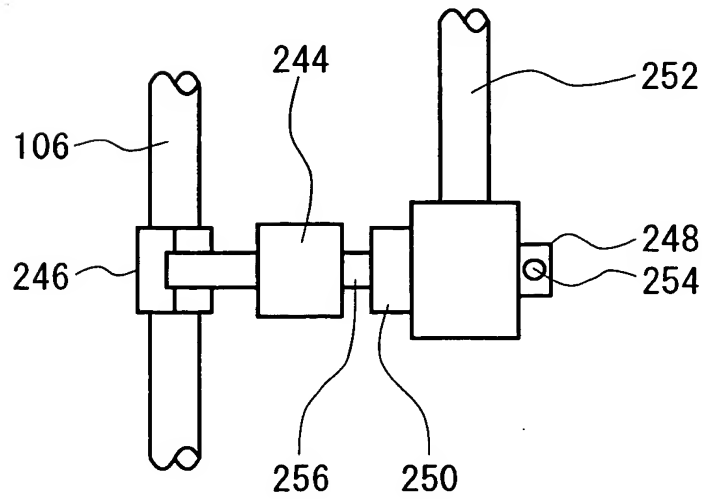
380

(a)



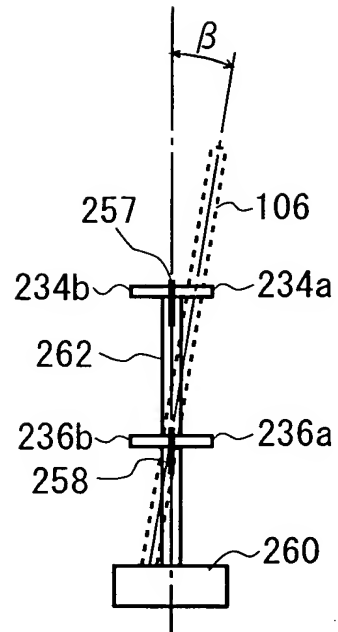
380

(b)

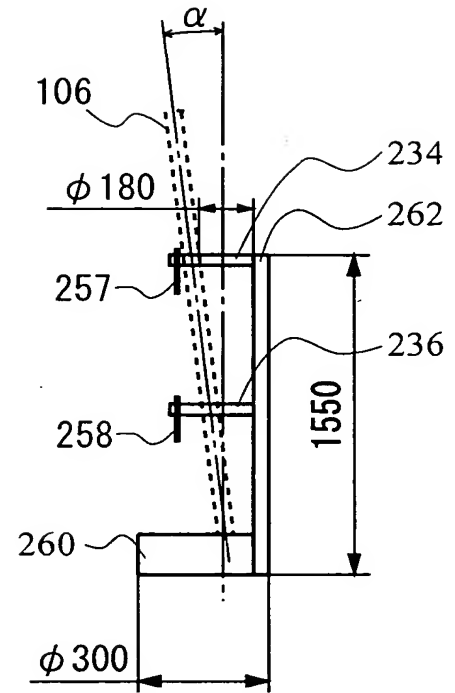


**FIG. 20**

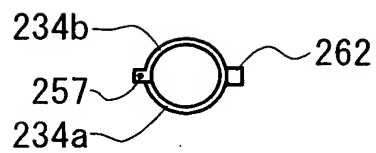




(a)



(b)



(c)

**FIG. 21**

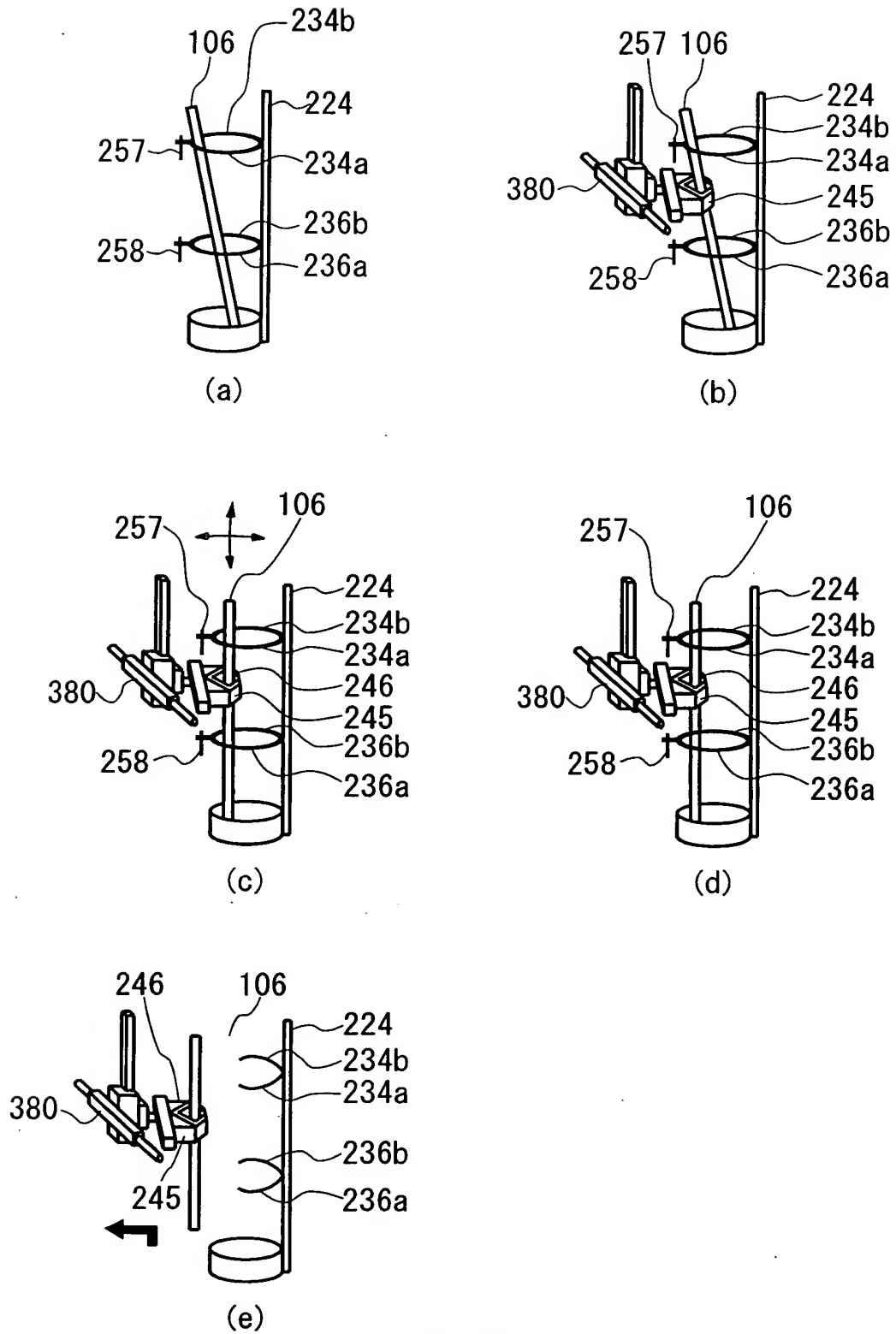
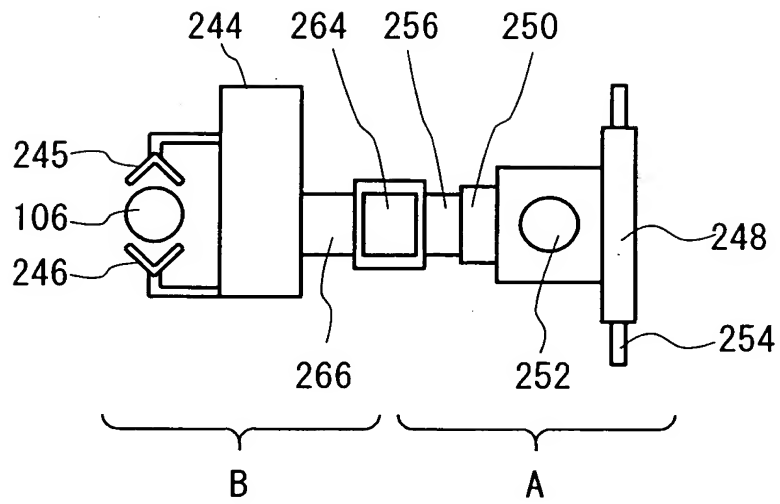


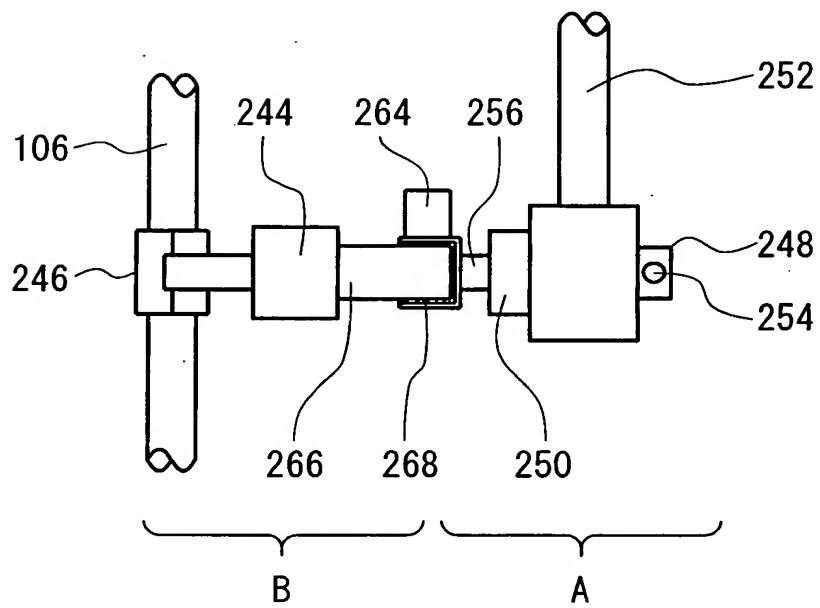
FIG. 22

380



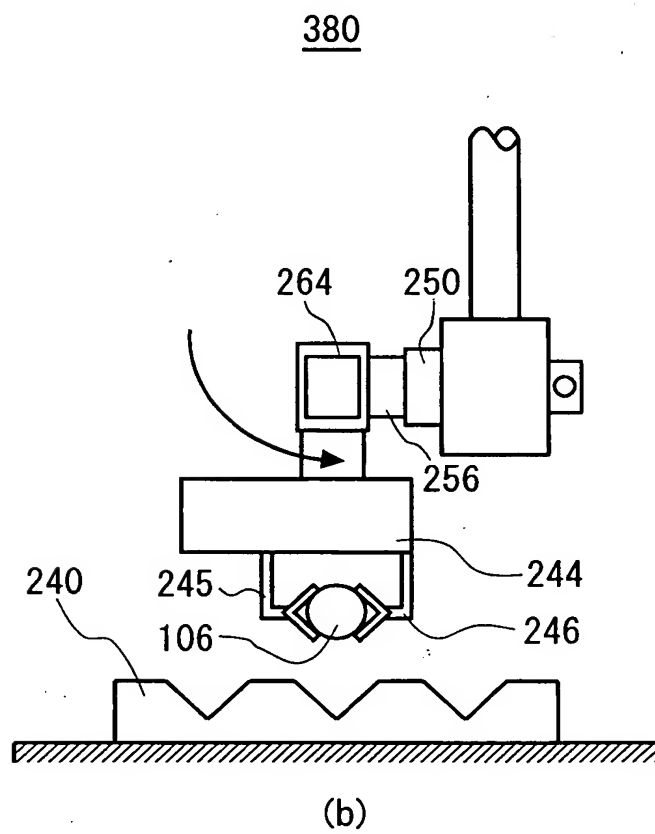
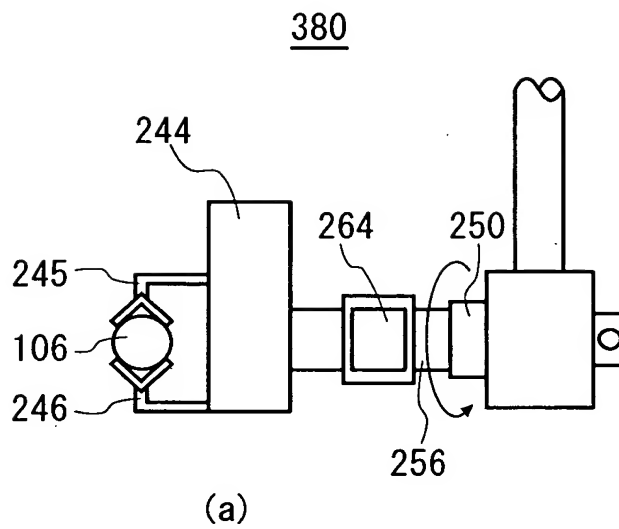
(a)

380



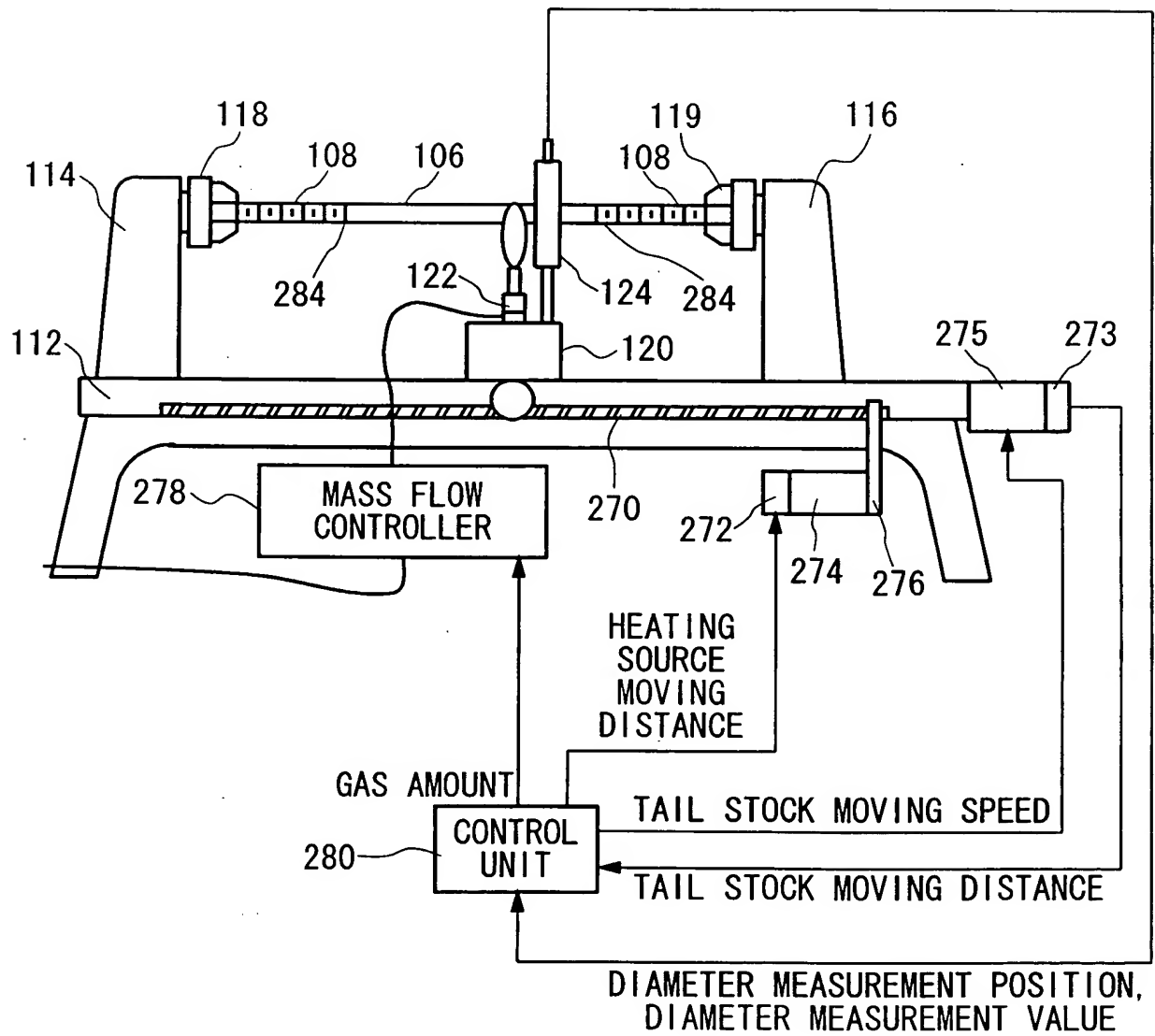
(b)

**FIG. 23**



**FIG. 24**

111



**FIG. 25**

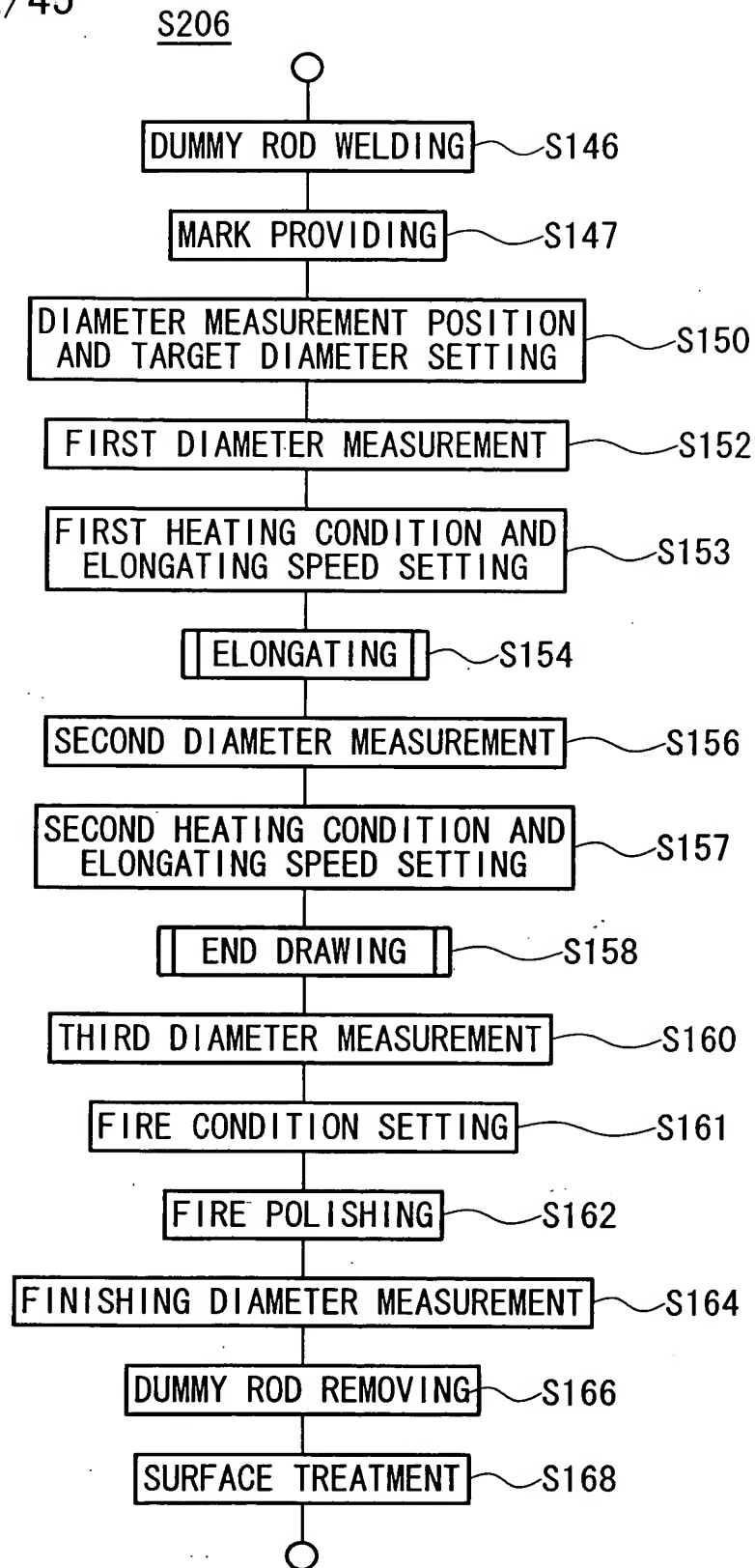


FIG. 26

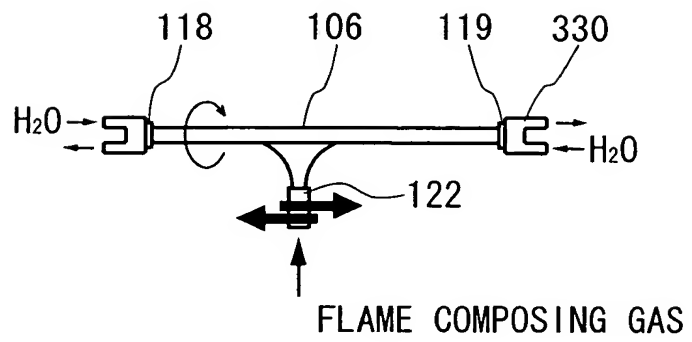
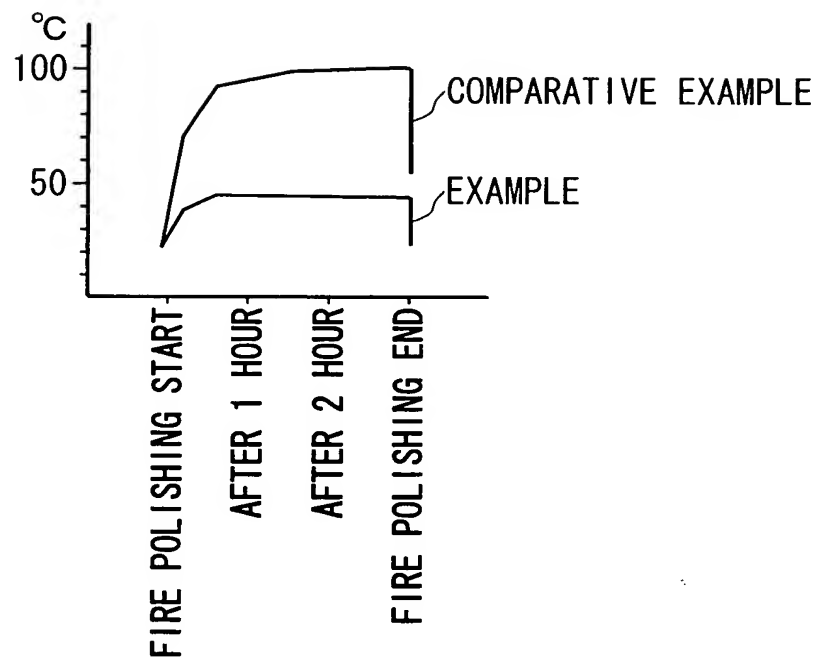


FIG. 27

**FIG. 28**



	DISTANCE BETWEEN HEATING SOURCE AND DIAMETER MEASUREMENT DEVICE	FLOW RATE OF GAS		HEATING SOURCE MOVING SPEED (mm/min)	PERCENTAGE OF FLUCTUATION OF DIAMETER OF GLASS ROD (%)
		HYDROGEN (l/min)	RATIO OF FLOW RATE OF HYDROGEN TO OXYGEN		
EXAMPLE1	15	224	2.5	11	0.9
EXAMPLE2	40	199	2.5	13	0.6
COMPARATIVE EXAMPLE1	5	209	2.5	12	3.7
COMPARATIVE EXAMPLE2	60	237	2.5	10	2.5
COMPARATIVE EXAMPLE3	15	215	1.0	12	COULD NOT DRAW
COMPARATIVE EXAMPLE4	15	195	4.0	13	COULD NOT DRAW
COMPARATIVE EXAMPLE5	15	204	2.5	70	COULD NOT DRAW

FIG. 29

111

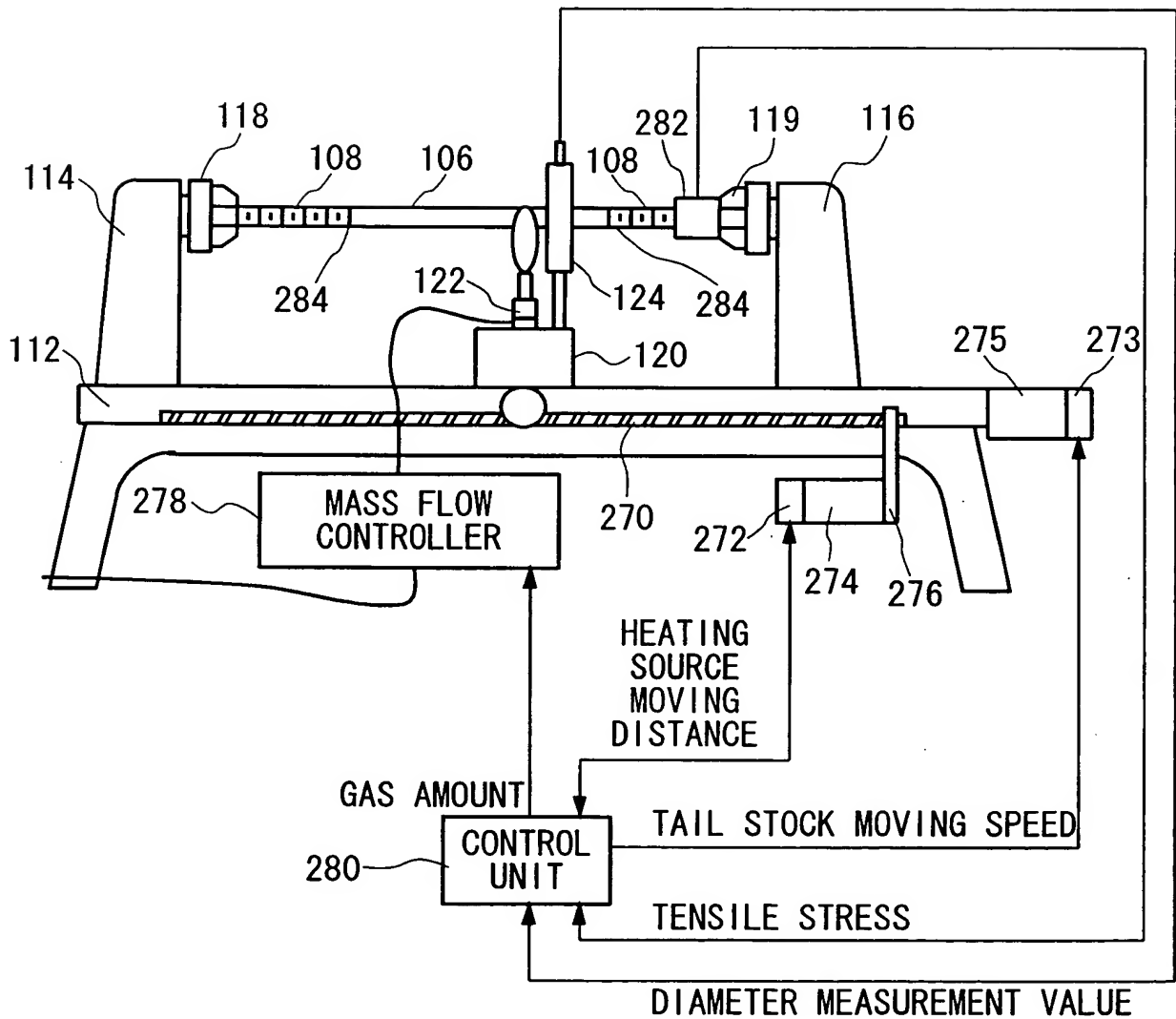


FIG. 30

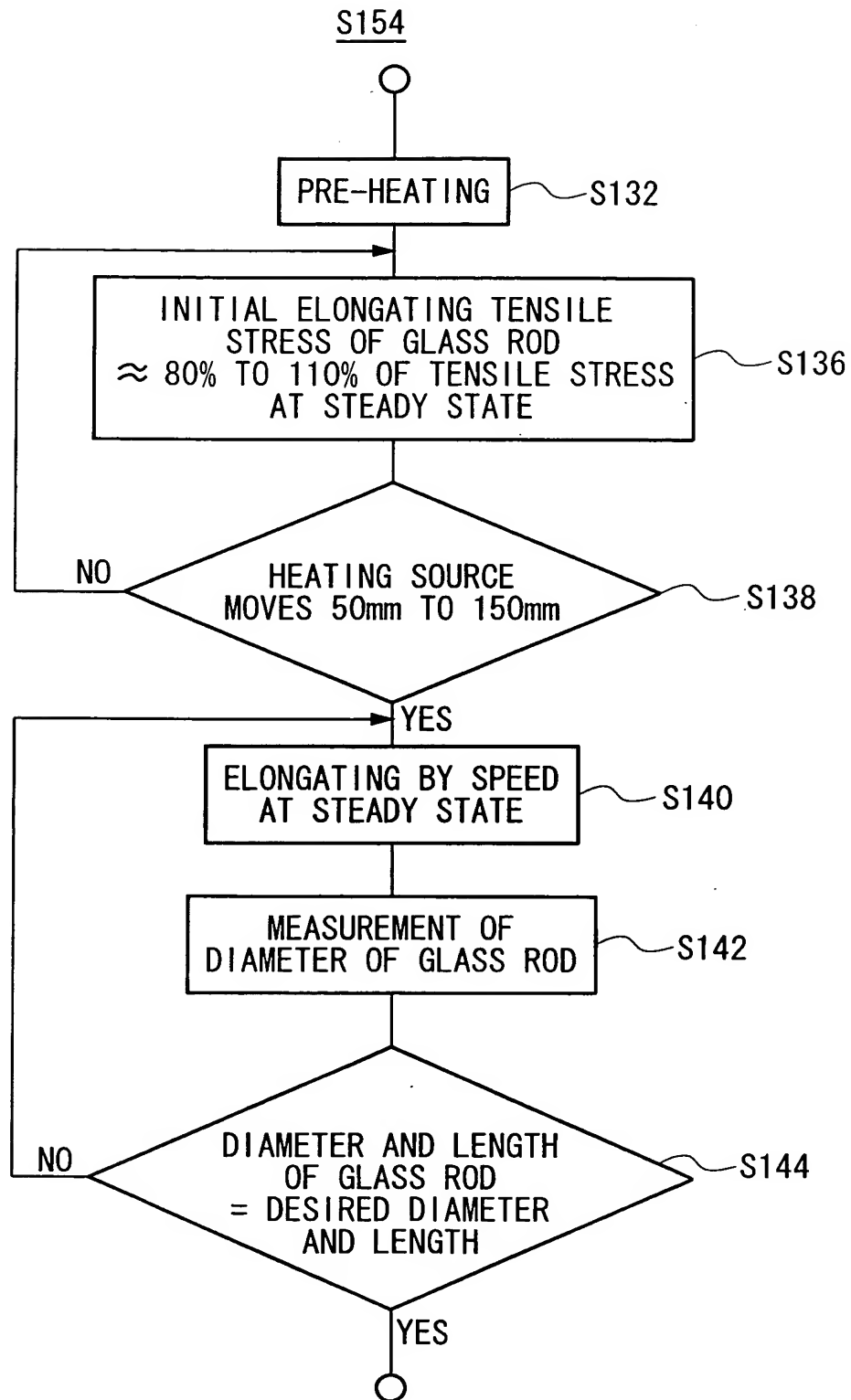


FIG. 31

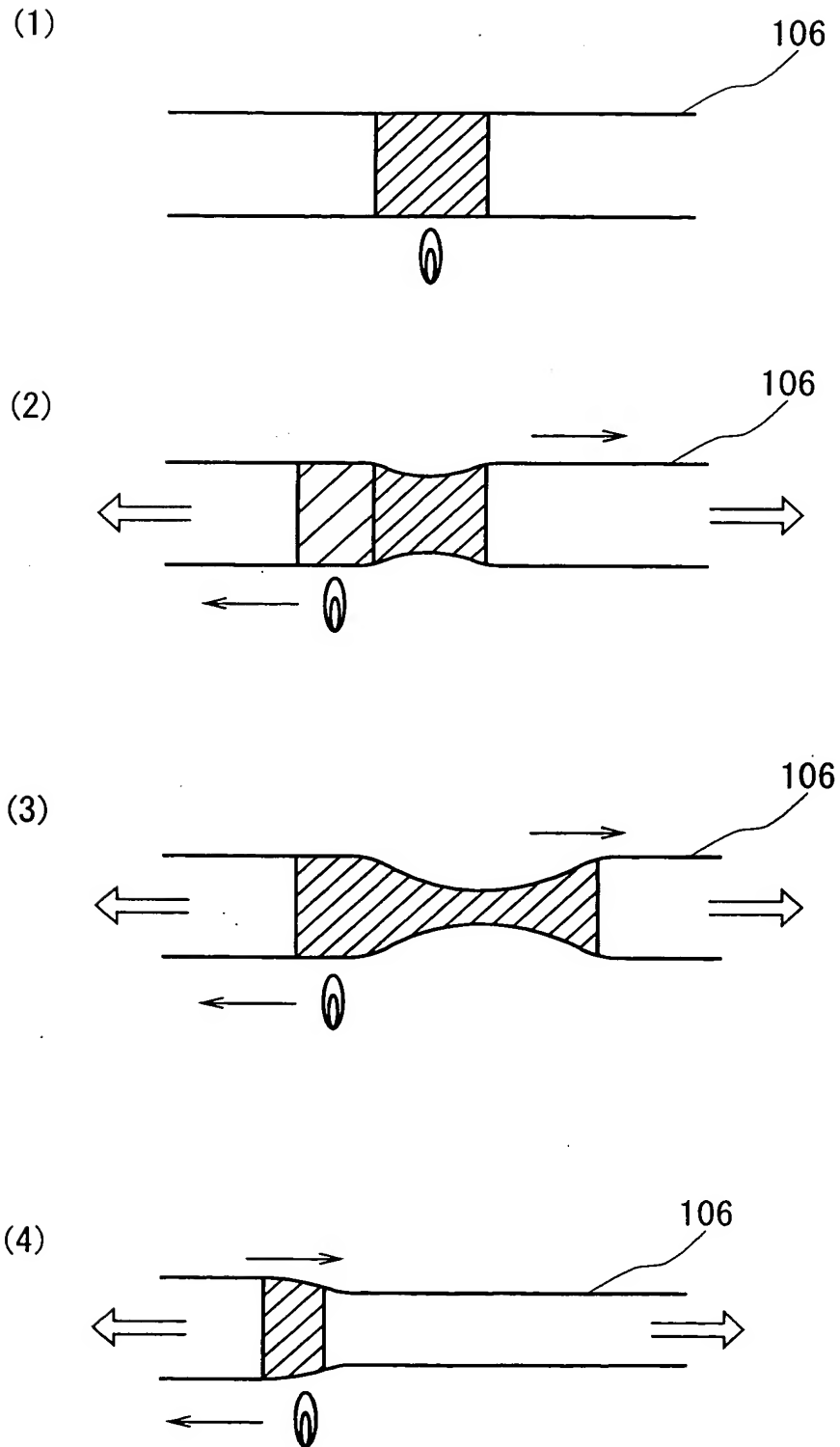


FIG. 32

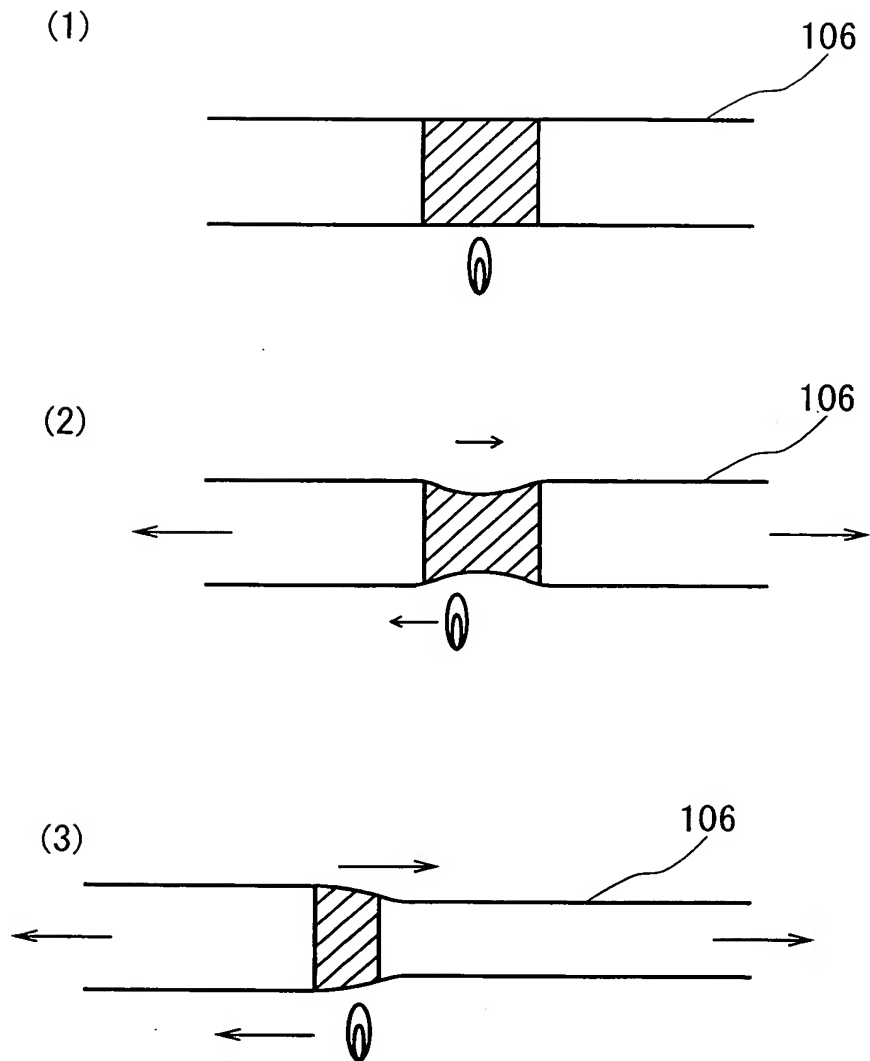


FIG. 33

30/45

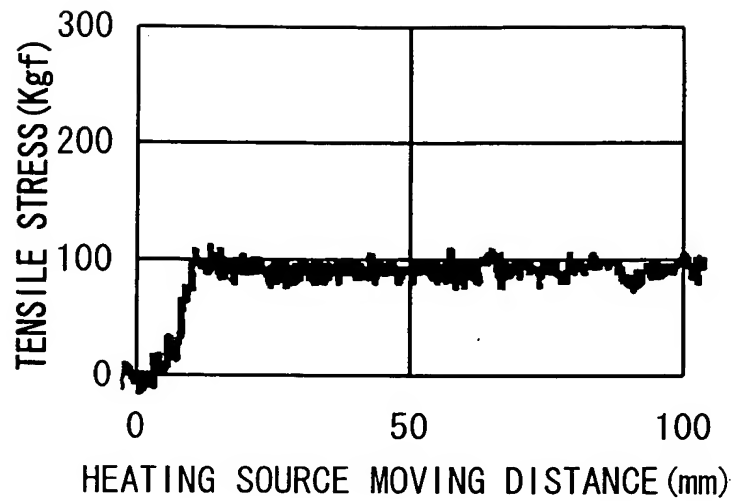


FIG. 34

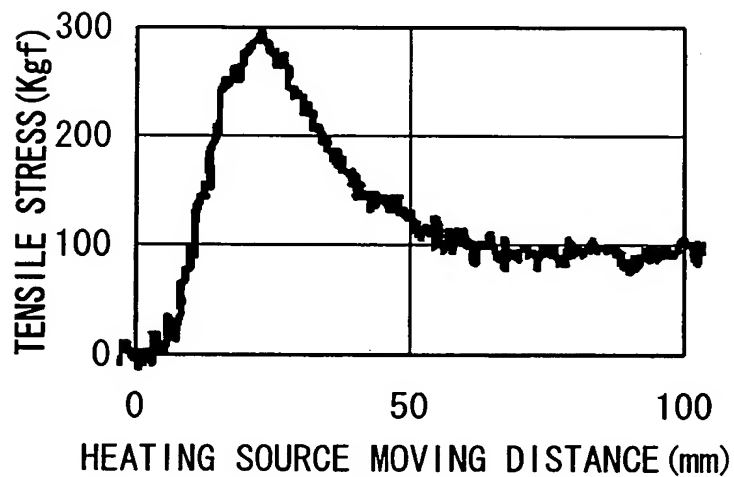


FIG. 35

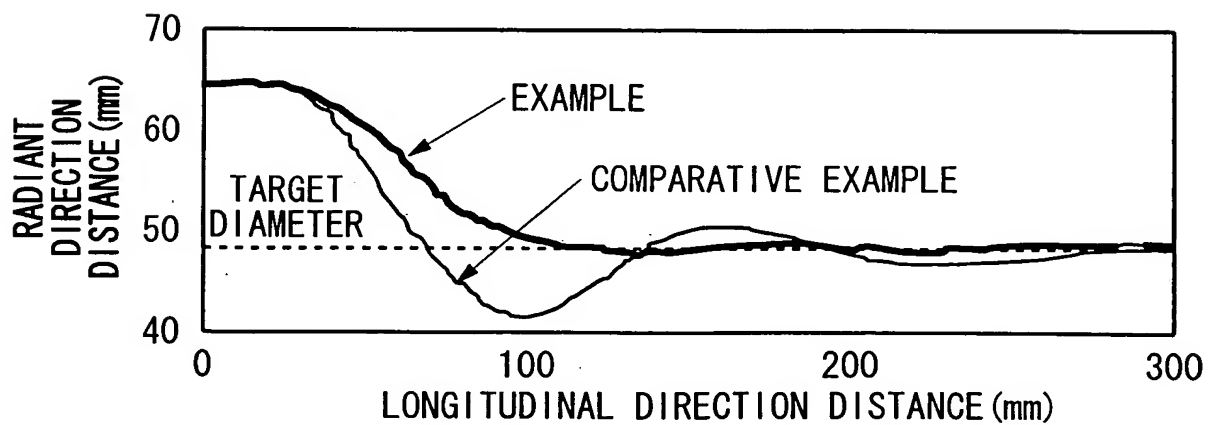
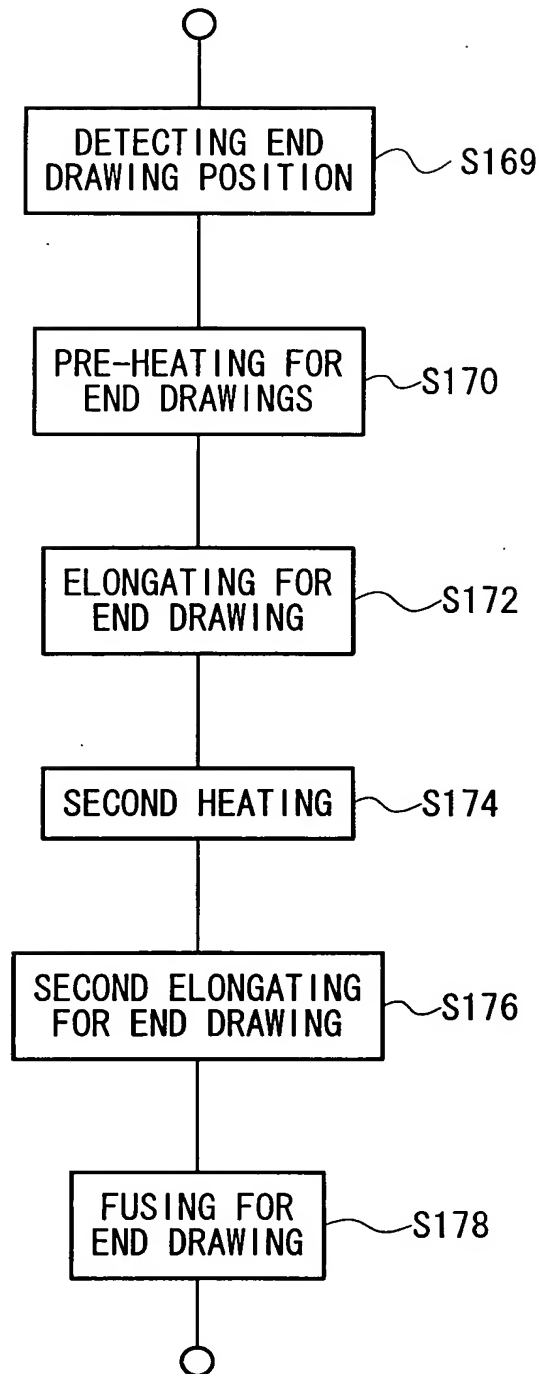


FIG. 36

31/45

S158



**FIG. 37**

32/45

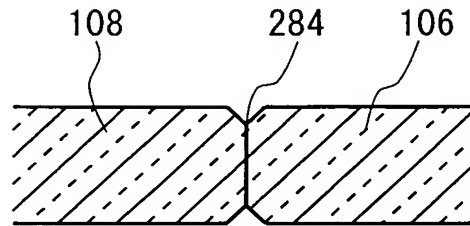


FIG. 38

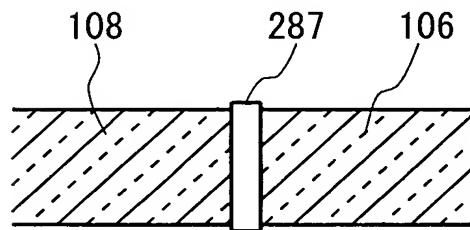


FIG. 39

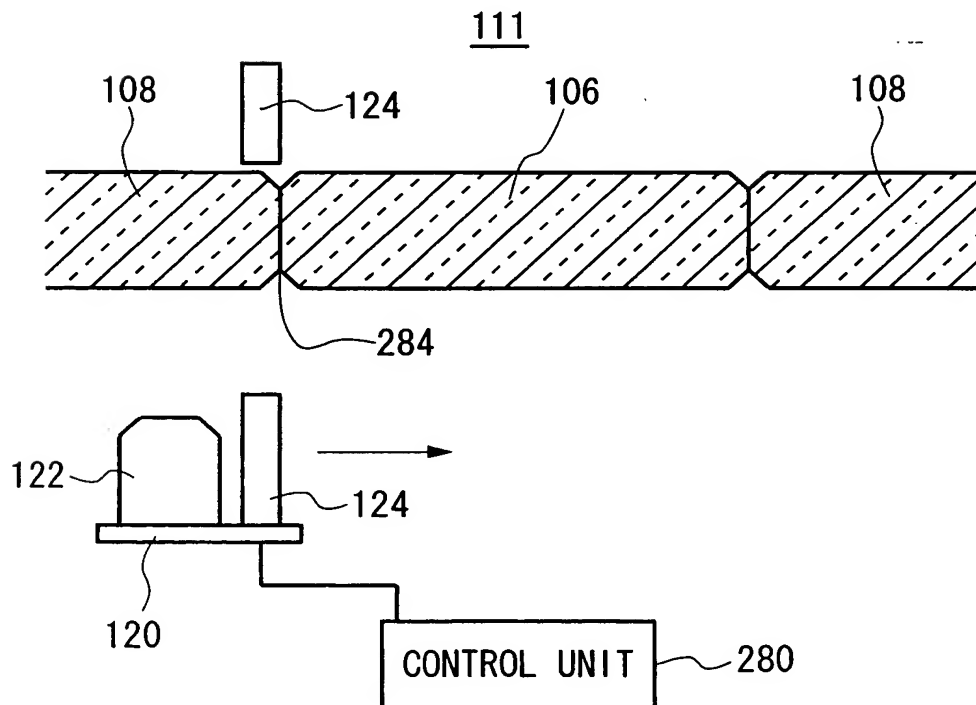
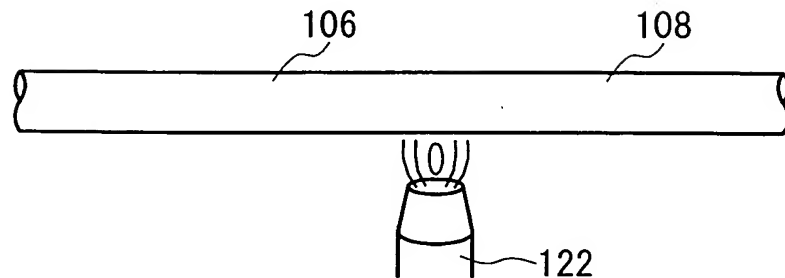


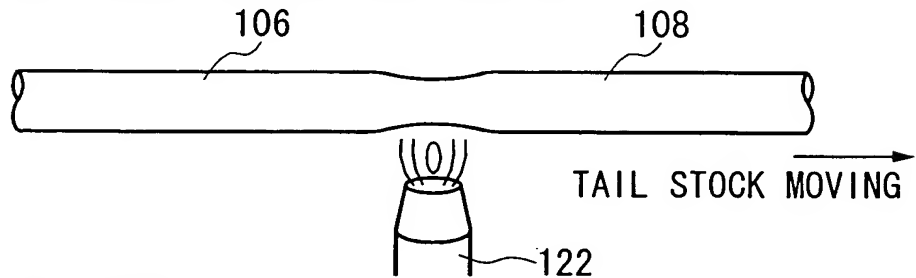
FIG. 40



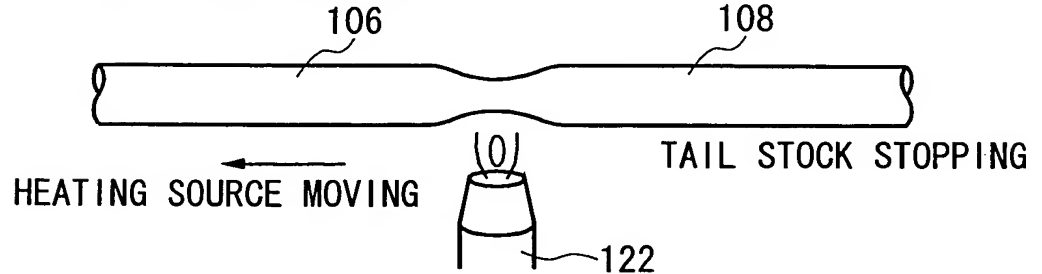
① PRE-HEATING FOR END DRAWING



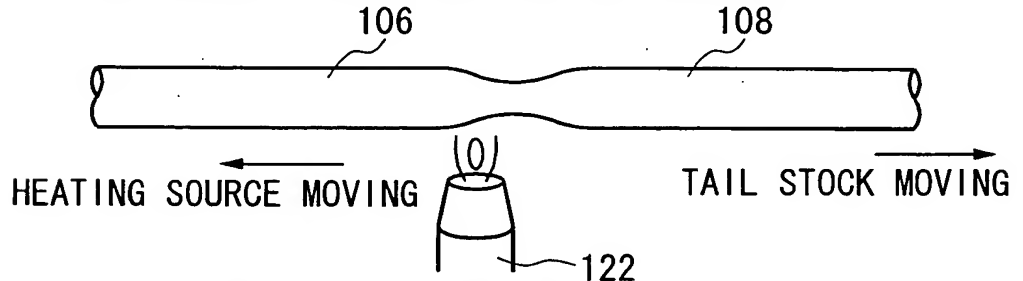
② ELONGATING FOR END DRAWING



③ SECOND HEATING



④ SECOND ELONGATING FOR END DRAWING



⑤ FUSING FOR END DRAWING

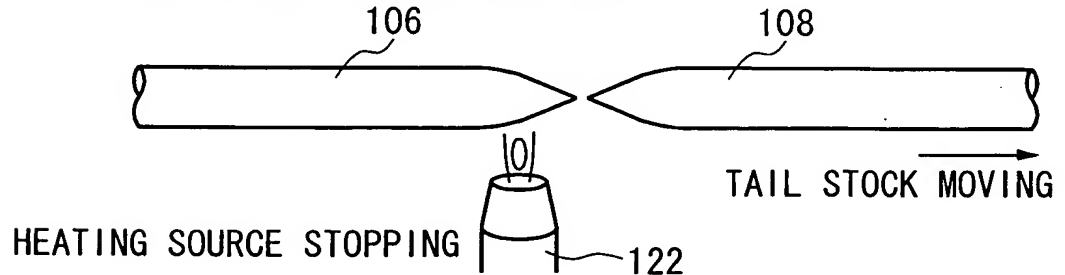


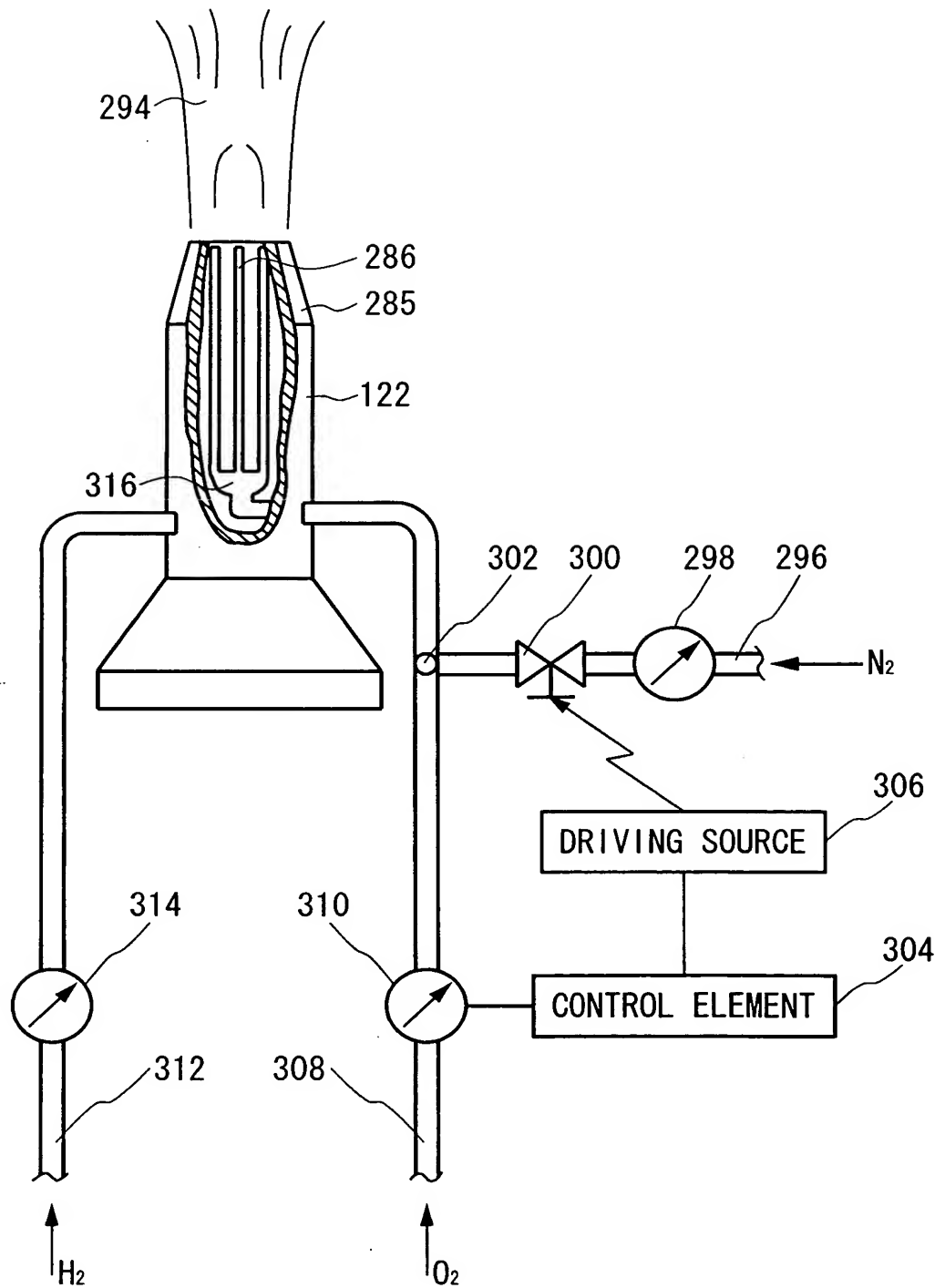
FIG. 41

PROCESS	PROGRESS TIME (second)	HEATING SOURCE GAS AMOUNT (cc/minute)			HEATING SOURCE MOVING DISTANCE (mm)	TAIL STOCK MOVING SPEED (mm/minute)
		H <sub>2</sub>	O <sub>2</sub> (INSIDE)	O <sub>2</sub> (OUTSIDE)		
① PRE-HEATING FOR END DRAWING	300	250	30	100	0	0
② ELONGATING FOR END DRAWING	60	250	30	100	0	10
③ SECOND HEATING	20	130	15	50	15	0
④ SECOND ELONGATING FOR END DRAWING	180	130	15	50	15→25	10
⑤ FUSING FOR END DRAWING	30	130	30	20	25	120

FIG. 42

PROCESS	TAIL STOCK MOVING DISTANCE	HEATING SOURCE GAS AMOUNT (cc/minute)			HEATING SOURCE MOVING DISTANCE (mm)	TAIL STOCK MOVING SPEED (mm/minute)
		H <sub>2</sub>	O <sub>2</sub> (INSIDE)	O <sub>2</sub> (OUTSIDE)		
① PRE-HEATING FOR END DRAWING	0 (300 seconds)	250	30	100	0	0
② ELONGATING FOR END DRAWING	0→30	250	30	100	0	10
③ SECOND HEATING	30→30	130	15	50	15	0
④ SECOND ELONGATING FOR END DRAWING	30→55	130	15	50	15→25	10
⑤ FUSING FOR END DRAWING	55→100	130	30	20	25	120

FIG. 43

**FIG. 44**

37/45

122

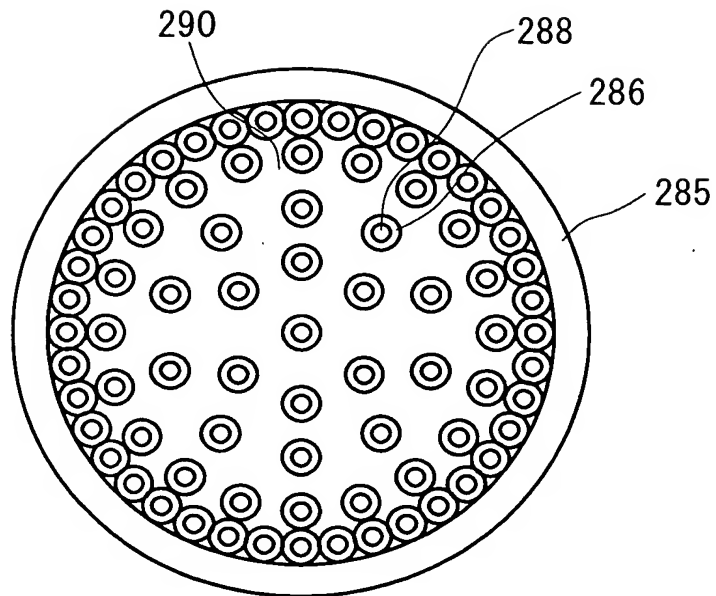


FIG. 45

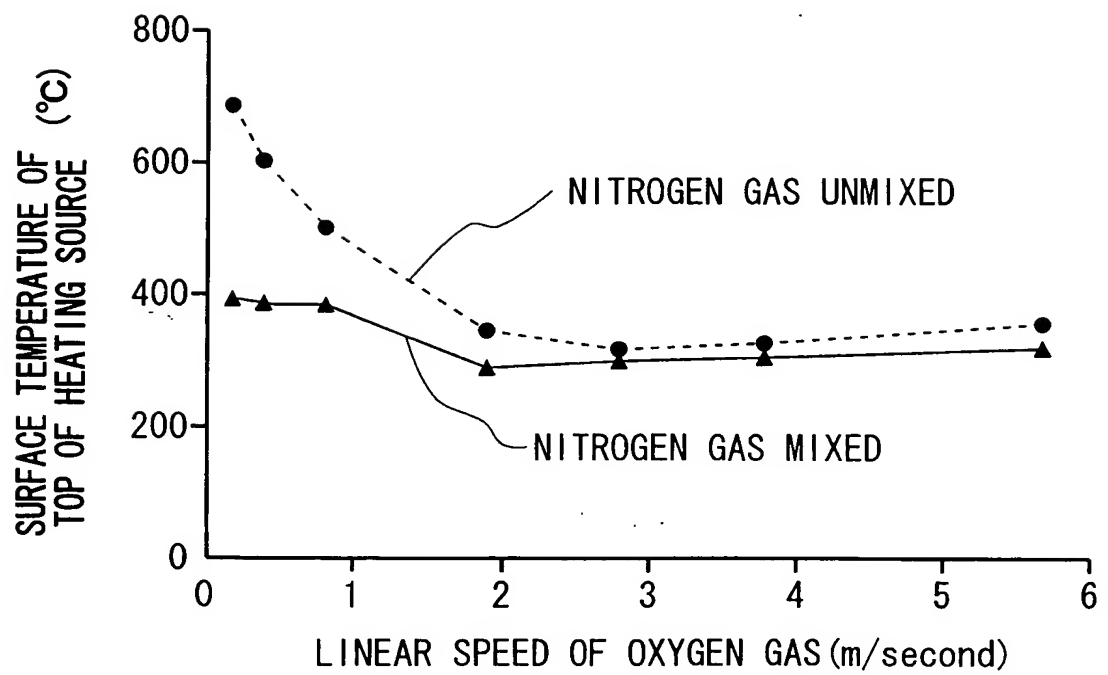
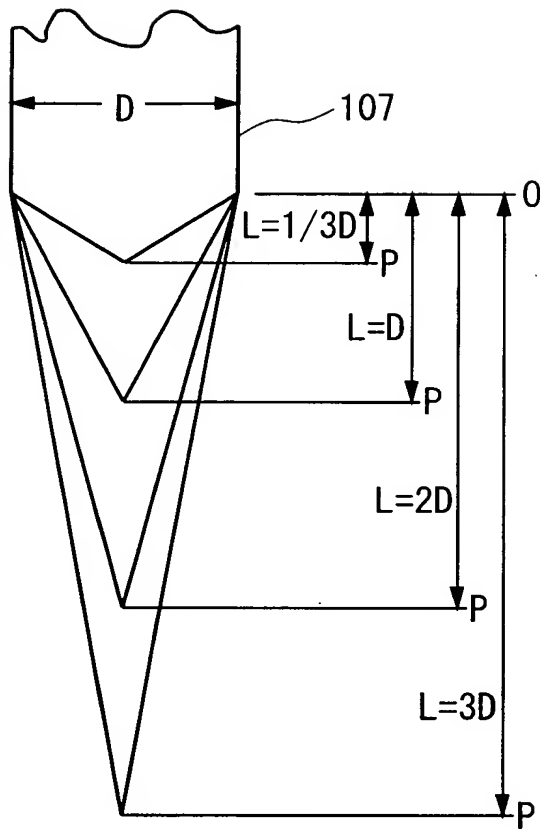
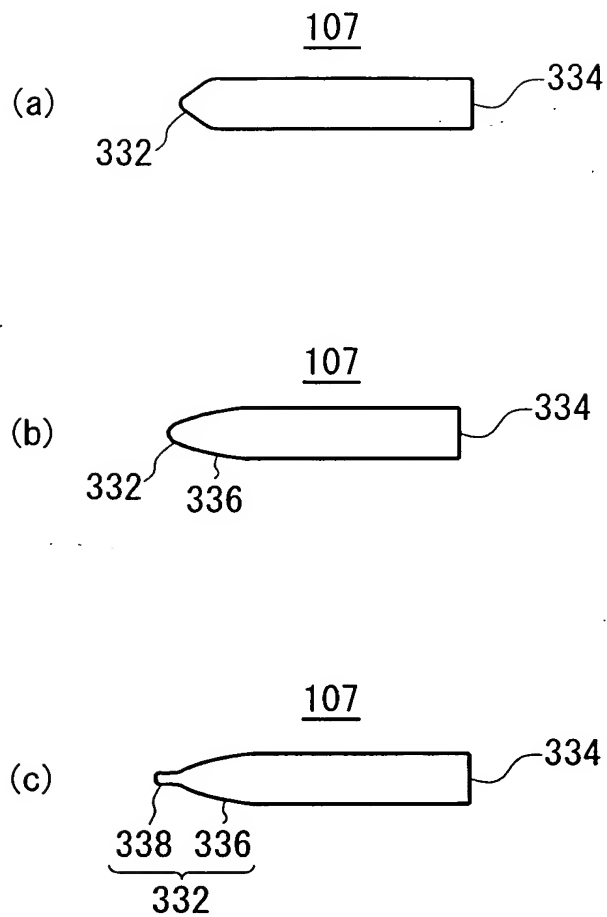


FIG. 46



**FIG. 47**

39/45



**FIG. 48**

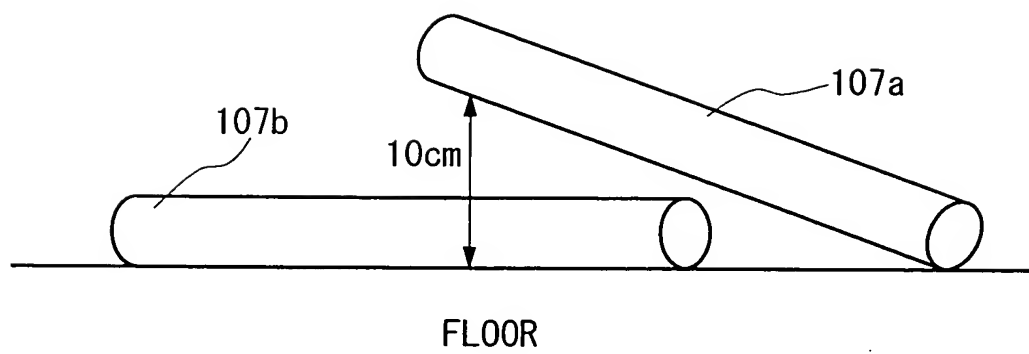


FIG. 49

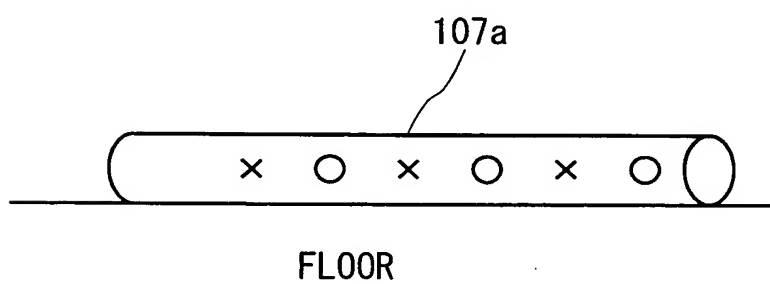


FIG. 50



NUMBER OF HYDROFLUORIC CONCAVES  
GENERATED BY HYDROFLUORIC ACID ETCHING

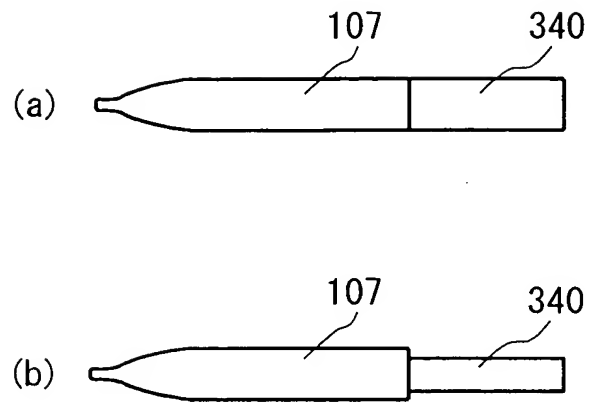
PRE-TREATING	ETCHING THICKNESS OF HYDROFLUORIC ACID ETCHING (mm)	NUMBER OF HYDROFLUORIC CONCAVES GENERATED BY HYDROFLUORIC ACID ETCHING (INSPECTION POINT:30) :COUNTED BY VISUAL INSPECTION	
		EXAMPLE	COMPARATIVE EXAMPLE
PRE-TREATING1	0.2	0	4
	1.2	2	9
	2.2	3	14
	3.2	5	19
PRE-TREATING2	0.2	1	7
	1.2	2	11
	2.2	4	19
	3.2	7	27

FIG. 51

## UNEVENNESS OF SURFACE

PRE-TREATING	QUANTITIES OF HYDROFLUORIC ACID ETCHING	DIAMETER OF UNDAMAGED POINT - DIAMETER OF DAMAGED POINT (mm)	
		EXAMPLE	COMPARATIVE EXAMPLE
PRE-TREATING1	0.2	0.07	0.13
	1.2	0.07	0.28
	2.2	0.09	0.65
	3.2	0.09	0.94
PRE-TREATING2	0.2	0.09	0.21
	1.2	0.10	0.35
	2.2	0.17	0.87
	3.2	0.18	1.24

FIG. 52



**FIG. 53**

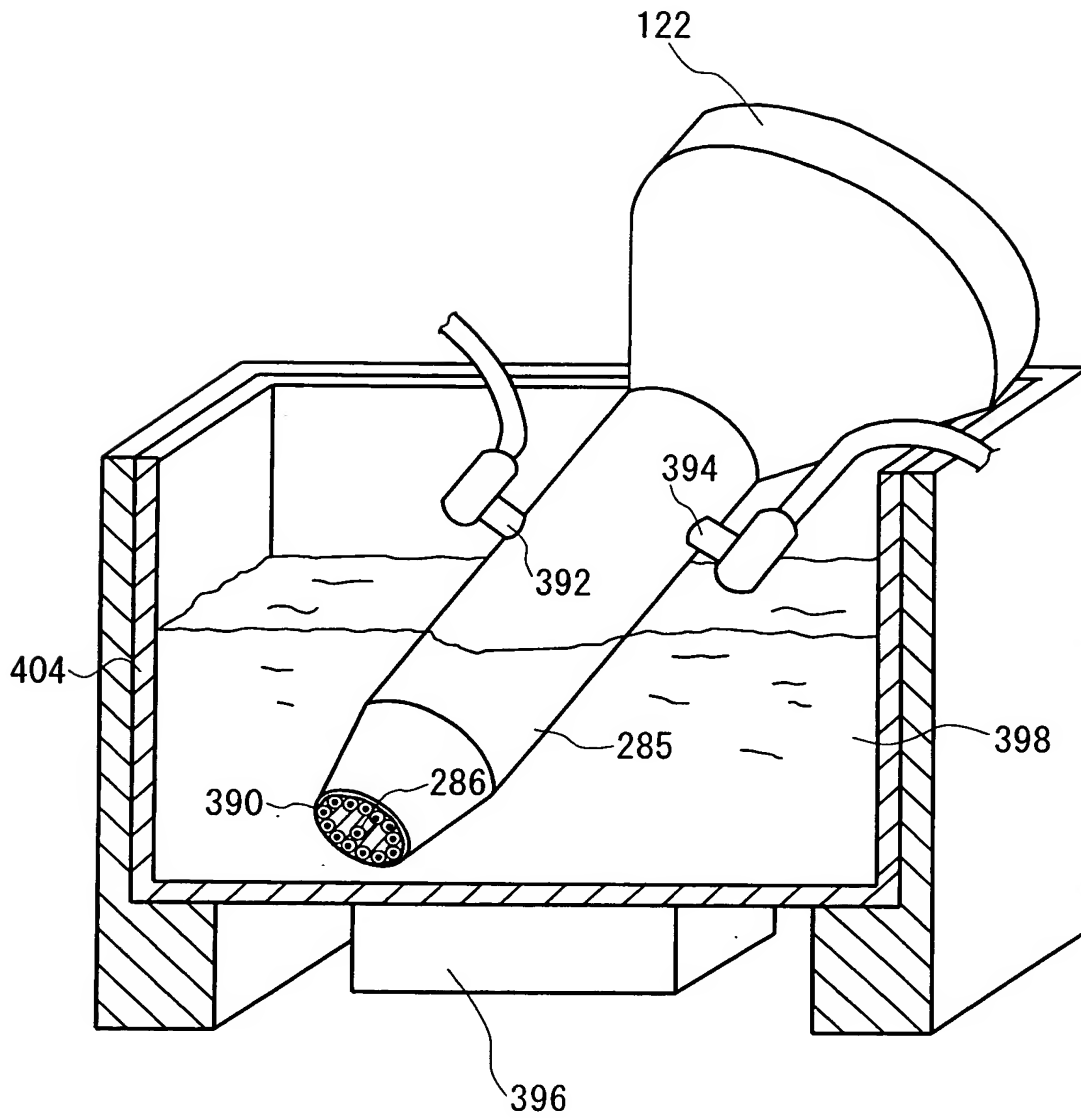
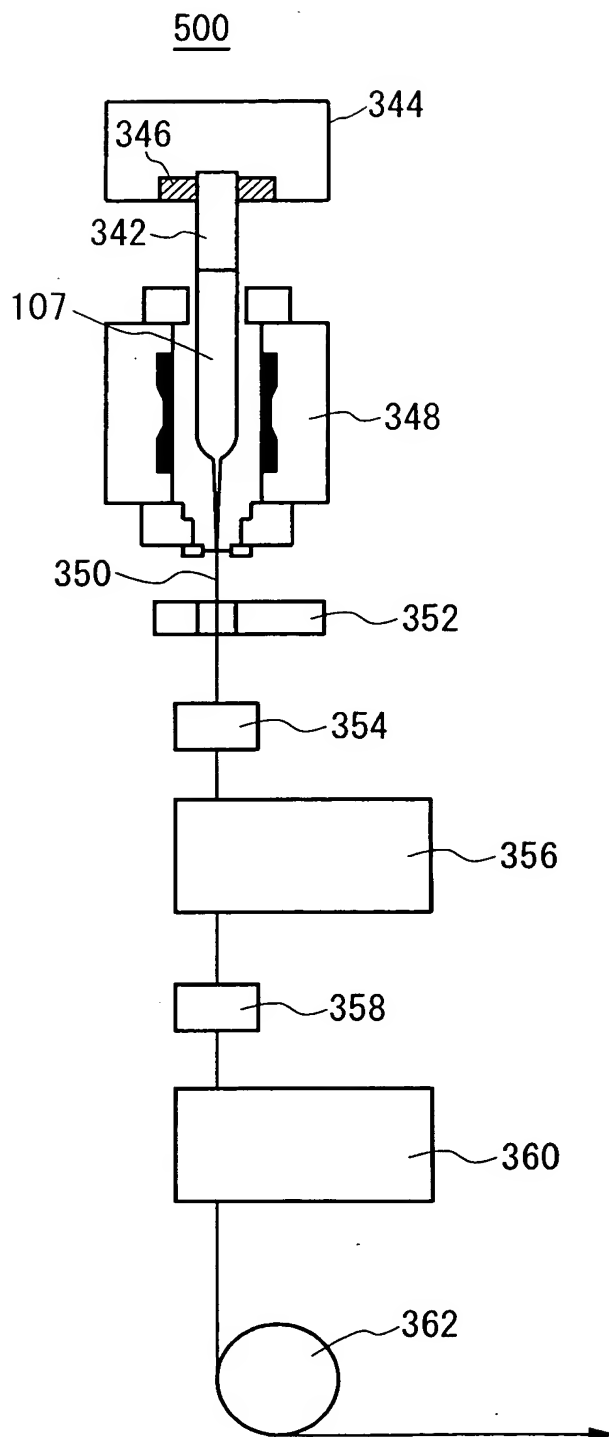


FIG. 54



**FIG. 55**